

The Evolution of the NASA-DoD Relationship
from Sputnik to the Lunar Landing

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A Dissertation submitted to

The Faculty of

Columbian School of Arts and Sciences
of The George Washington University in partial satisfaction
of the requirements for the degree of Doctor of Philosophy

May 18, 1997

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ABSTRACT OF DISSERTATION

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Between Sputnik's launching in October 1957 and the lunar landing in July 1969 America sponsored five human spaceflight projects. NASA's Mercury, Gemini, and Apollo were well publicized and to varying degrees Presidents Dwight D. Eisenhower, John F. Kennedy, and Lyndon B. Johnson used them as tools for garnering international prestige in the cold war competition with the Soviet Union. However, Dynasoar and the Manned Orbiting Laboratory (MOL) of the DoD were largely classified and fundamentally oriented toward the military mission of reconnaissance.

This study examines the NASA-DoD relationship with a special emphasis on these two sets of projects by asking three questions. First, what did each president believe about using space exploration as a cold war competitive tool? Eisenhower was not at all keen on such a construct; he did not believe the US should race to the moon in search of prestige. Kennedy did and reoriented American space policy toward the moon. Johnson continued this lunar landing goal but refused to expand American space policy beyond it as he grappled with the demands of Vietnam and the Great Society. Second, what was the institutional relationship between NASA and the DoD? This relationship was a complex one involving simultaneous support, coordination, and rivalry under all three presidents. However, over the course of twelve years NASA achieved greater independence while lessening its reliance on the DoD.

Third, what was the specific interaction among the projects themselves? Under Eisenhower Dynasoar and Mercury achieved their initial momentum. The DoD offered critical support for Mercury but Mercury's capabilities did not seriously endanger the existence of Dynasoar. In Kennedy's administration the Gemini program was born and matured to the point where Secretary of Defense Robert S. McNamara concluded Dynasoar was largely redundant and canceled it a few days after Kennedy's death. McNamara

simultaneously initiated MOL. Under Johnson MOL and Apollo matured and while the MOL maintained a tenuous hold on life as a reconnaissance platform, it would also be canceled shortly after he left office, again largely due to perceived duplication of NASA capabilities, among other factors.

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ABBREVIATIONS
in text and footnotes

AACB	Aeronautics and Astronautics Coordinating Board
AAP	Apollo Applications Program
ABMA	Army Ballistic Missile Agency
AEC	Atomic Energy Commission
AFB	Air Force Base
AFHRA	United States Air Force Historical Research Agency, Maxwell AFB, AL
AFHSO	United States Air Force History Support Office, Bolling AFB, DC
AFSC	Air Force Systems Command
AMR	Atlantic Missile Range
ARDC	USAF Air Research and Development Command
ARPA	Advanced Research Projects Agency
ARS	American Rocket Society
ASTP	Apollo-Soyuz Test Project
ATM	Apollo Telescope Mount
BMD	Ballistic Missile Divison, USAF
BoB	Bureau of the Budget
CMLC	Civilian-Military Liaison Committee
COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
CSAF	Chief of Staff of the USAF, the service's top-ranking officer
DDEL	Dwight D. Eisenhower Library
DDR&E	Director of Defense Research and Engineering
DoD	Department of Defense
Dynasoar	Dynamic Soaring space vehicle
ELINT	Electronic intelligence
EOR	Earth Orbit Rendezvous
ETR	Eastern Test Range, FL
EVA	Extravehicular activity ("space walking")
<i>FRUS</i>	<i>Foreign Relations of the United States</i>
FY	Fiscal Year
GALCIT	Guggenheim Aeronautical Laboratory, California Institute of Technology
GNP	Gross National Product
GPPB	Gemini Program and Planning Board
HDLO	Historical Division Liaison Office
HSTL	Harry S. Truman Library
ICBM	Intercontinental Ballistic Missile
IGY	International Geophysical Year
IRBM	Intermediate Range Ballistic Missile
<i>ISMP</i>	<i>Inquiry into Satellite and Missile Programs</i> , of the Senate Preparedness Subcommittee
JCS	Joint Chiefs of Staff
JPL	Jet Propulsion Laboratory
LEM	Lunar Excursion (sometimes Expedition) Module
LLVPG	Large Launch Vehicle Planning Group
LoC	Library of Congress
LOR	Lunar Orbit Rendezvous
MA	Mercury-Atlas
Memcon	Memorandum of Conference with President Eisenhower
MILA	Merritt Island Launch Area, FL
MODS	Military Orbital Development System
MOL	Manned Orbiting Laboratory
MORL	Manned Orbital Research Laboratory
MOU	Memorandum of Understanding

MR	Mercury-Redstone
MTSS	Military Test Space Station
MSFPC	Manned Space Flight Policy Committee
NACA	National Advisory Committee for Aeronautics
NARA	National Archives and Records Administration
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NASC	National Aeronautics and Space Council
NASM	National Air and Space Museum
NIE	National Intelligence Estimate
NHDC	NASA Historical Data Reference Collection, NASA History Office, Washington, DC
NRL	Naval Research Laboratory
NRO	National Reconnaissance Office
NSA MUS	National Security Archive, Military Uses of Space microfiche document collection
NSAM	National Security Action Memorandum of the NSC
NSA PD	National Security Archive, Presidential Directives on National Security microfiche document collection.
NSC	National Security Council
NSF	National Science Foundation
OCB	Operations Coordinating Board of the NSC
ODA	Office of Defense Affairs, NASA
OMSF	Office of Manned Space Flight
OSANSA	Office of the Special Assistant for National Security Affairs, White House
OSAST	Office of the Special Assistant for Science and Technology, White House
OSD	Office of the Secretary of Defense
OST	Office of Science and Technology, White House
PARD	NACA Pilotless Aircraft Research Division
PBCFIA	President's Board of Consultants on Foreign Intelligence Activities
PL	Public Law
PSAC	President's Science Advisory Committee
R&D	Research and development
RG	NARA Record Group
SPI	Space Policy Institute Archive, George Washington University, Washington, DC
SSD	Space Systems Division of the AFSC
STG	Space Task Group
STS	Space Transportation System (space shuttle)
TCP	Technological Capabilities Panel
UN	United Nations
USAF	United States Air Force
USGPO	United States Government Printing Office
USSR	Union of Soviet Socialist Republics
VCSAF	Vice Chief of Staff of the Air Force
WWI	World War I
WWII	World War II

The Mercury, Gemini, and Apollo capsules
(courtesy of the NASA History Office)

CAPSULE COMPARISON



MERCURY
DIA. - 74.5"
L. - 115"



GEMINI
DIA. - 90"
L. - 228"

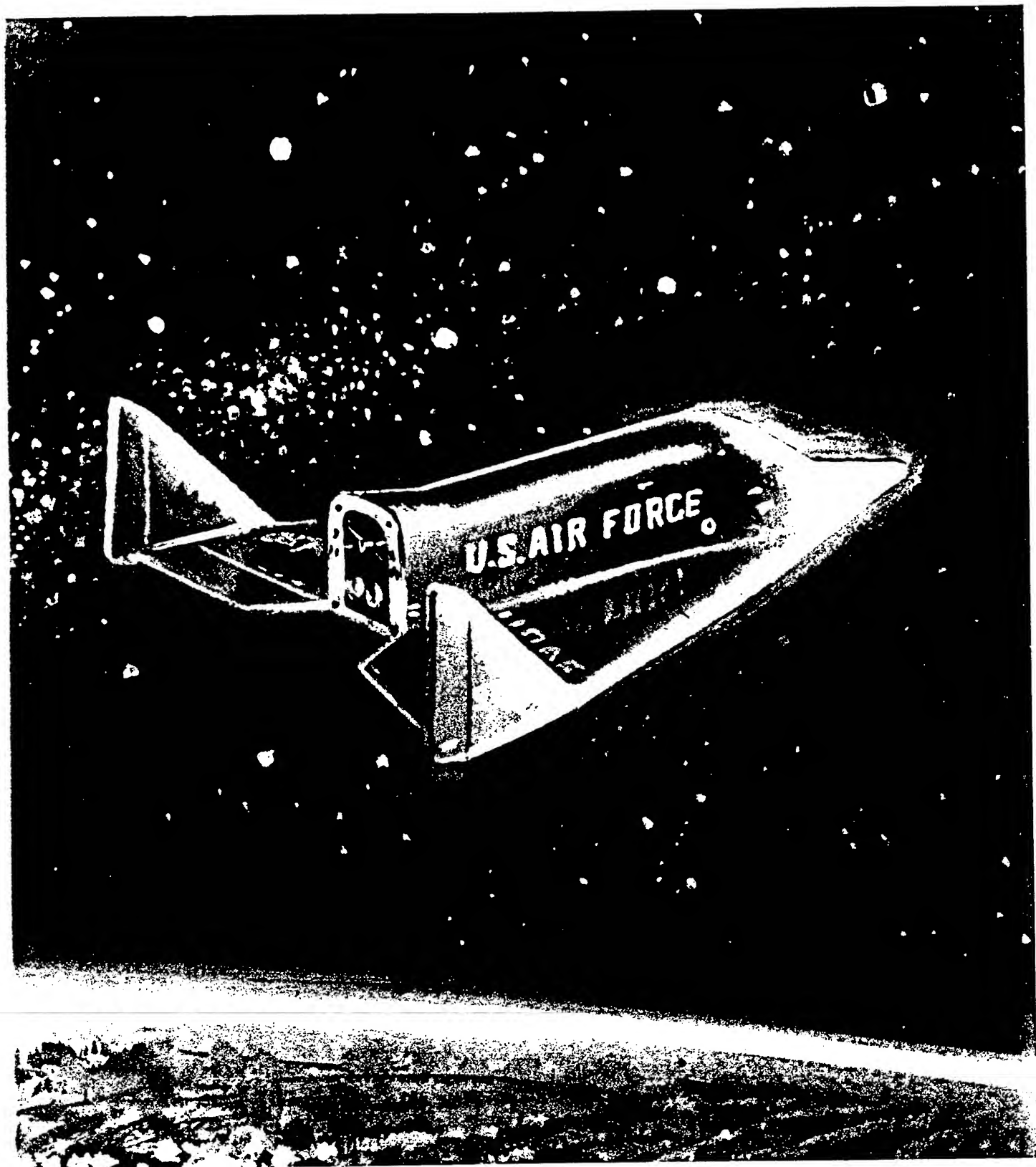


APOLLO
DIA. - 154"
L. - 132"

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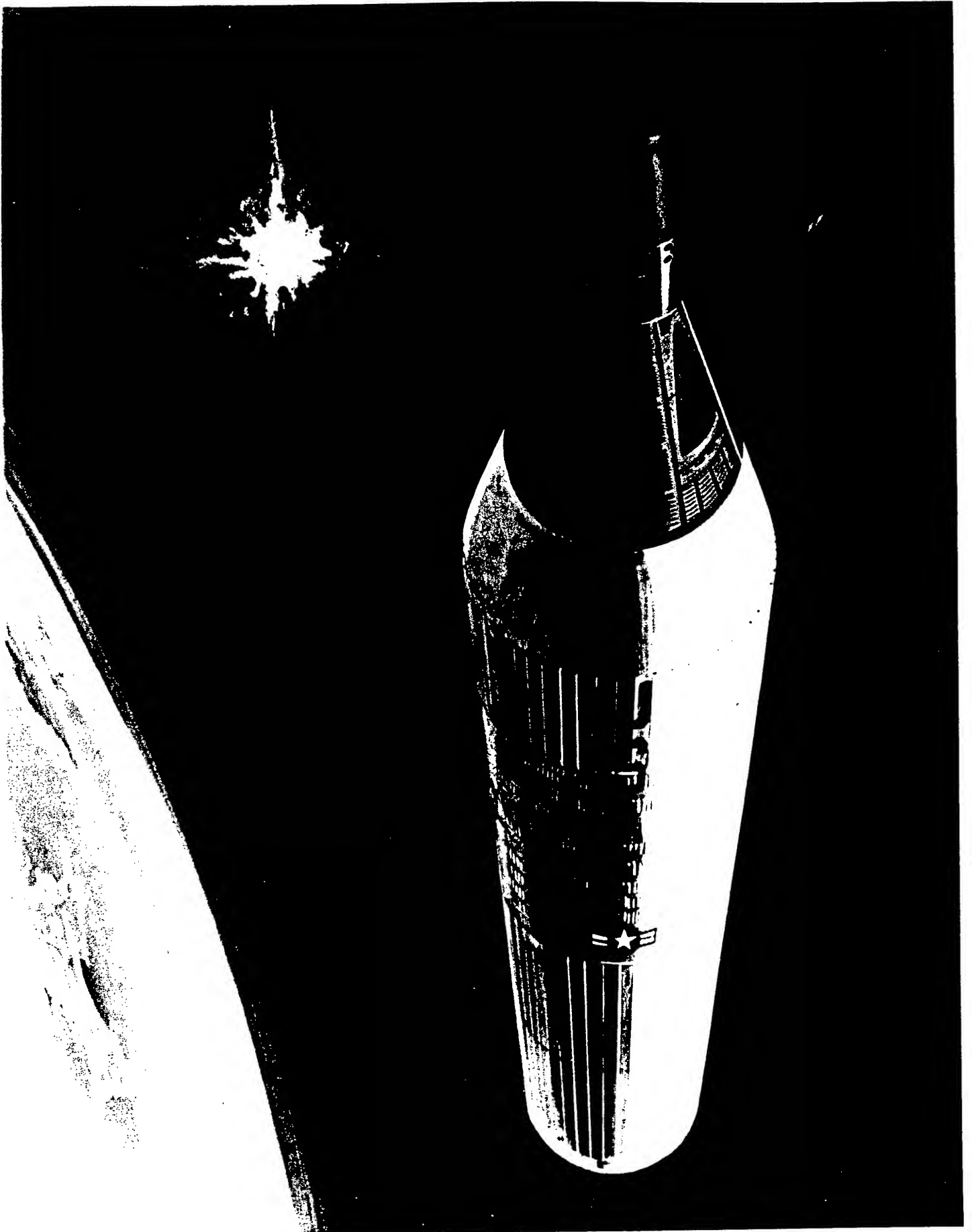
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Conceptual rendering of Dynasoar
(courtesy of the NASA History Office)



Conceptual rendering of the Manned Orbiting Laboratory

(Courtesy of the NASA History Office)



1. Introduction

The initial driving force for a strong American space program was not scientific, economic, or romantic, but political - the pursuit of national prestige and power by a new means and in a new frontier.¹

For 30 years, cold war rivalry was the lifeblood of both U.S. and Soviet programs of human spaceflight.²

... the Department of Defense was the one Federal agency with which NASA had to come to terms in order to carry out its mission at all. The essence of their relationship had far more to do with mutual need than with philosophical arguments concerning the existence or the desirability of one space program or two.³

Born as a civilian sparrow in a nest of warbirds, NASA grew up and flew.⁴

Methodology and Historiography

Only a dozen years separated the October 4, 1957 launching by the Soviet Union of the first artificial earth satellite, Sputnik I, and the successful American landing and return from the moon in July 1969. During this period of time America sponsored five separate human spaceflight programs. The National Aeronautics and Space Administration (NASA) started and completed Projects Mercury and Gemini while its Project Apollo would land on the moon five more times before December 1972.⁵ However,

¹ John Noble Wilford, "A Spacefaring People: Keynote Address," in *A Spacefaring People: Perspectives on Early Spaceflight*, ed. Alex Roland, NASA SP-4405 (Washington, DC: USGPO), 69.

² John Logsdon and Alain Dupas, "Was the Race to the Moon Real?" *Scientific American* (June 1994): 23.

³ Arnold S. Levine, *Managing NASA in the Apollo Era*, NASA SP-4102 (Washington, DC: USGPO), 211.

⁴ Walter McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., Publishers, 1985), 208.

⁵ Apollo hardware and its Saturn family of launch vehicles were also used for the three Skylab missions in 1973 and the Apollo Soyuz Test Project in 1975. For summarized factual information on NASA launches see NASA, *NASA Pocket Statistics* (Washington, DC: USGPO, 1996).

the Department of Defense's (DoD) Project Dynasoar⁶ was canceled in December 1963 and its Manned Orbiting Laboratory (MOL) was canceled in June 1969. Therefore, the Air Force as the agency directly responsible for both programs was frustrated in both its attempts to evaluate and use humans in space for military purposes. This study will attempt to examine the NASA-DoD relationship, with a special focus on these human spaceflight projects, and the larger context in which this relationship was forged. It is hoped by examining the geopolitical, domestic political, and bureaucratic environments in which decisions concerning these projects were made, the relationships between America's first five human spaceflight projects will become clear.

Three levels of questions must be investigated to fully understand the NASA-DoD relationship in human spaceflight programs. First, what was the attitude of each president in question, Dwight D. Eisenhower, John F. Kennedy, and Lyndon B. Johnson, toward the use of space exploration as a tool to secure international prestige and national pride as part of the cold war struggle with the Soviet Union? While a complete examination of each president's cold war policies and general beliefs is outside the scope of this work, it is necessary to touch upon the highlights of Eisenhower's, Kennedy's, and Johnson's fundamental perspective on the Soviet Union and the Cold War. More important, however, is to examine what each man specifically believed concerning the role space exploration was to play in the geopolitical struggle with the Union of Soviet Socialist Republics (USSR). This will be accomplished by analyzing the president's pronouncements on such topics as space for peaceful pursuits, human spaceflight, and space for prestige purposes. Each president's concrete actions in the field of space policy, human spaceflight projects, and cooperation with the USSR in space will also be a key piece of the puzzle.

Second, the institutional relationship between NASA and the DoD will be examined. What was the level of support, coordination and rivalry that existed between these two bureaucracies during each president's term(s)? What specific instances and programs illustrate these dynamics? What role did individual personalities play in this interaction? It will be seen that equally important to the NASA-DoD relationship was the relationship within DoD between the Office of the Secretary of Defense (OSD) and

⁶ The word "Dynasoar" is alternately rendered as "Dyna-Soar," "Dyna Soar," and capitalized versions of all three. It is a contraction neologism of "dynamic soaring" created by the Air Force.

the Air Force. Reluctance on the part of Secretary of Defense Robert S. McNamara during the Kennedy and Johnson administrations to authorize and fund the human spaceflight projects the Air Force concluded it required to guarantee national security often created a level of tension far in excess of any that may have existed between NASA and the DoD.

The third and final level of inquiry will focus on the actual projects themselves: Mercury, Gemini, Apollo, Dynasoar and MOL. What was each designed to accomplish and why? Did the existence of one at a particular point in time endanger any others due to perceived duplication? The answer to this second question is clearly yes. The Air Force saw both its human spaceflight projects canceled: Dynasoar in 1963 and MOL in 1969. In neither case was this due to NASA's urging. In both there was a complex mixture of financial, political, international, and institutional factors that eventually led to each project's demise. Therefore, the NASA-DoD relationship involves many more actors than simply the two protagonists.

The existing scholarly literature on this set of questions is relatively thin. First and most important is chapter 8, "The Structure of NASA-DOD Relations" of Arnold S. Levine's *Managing NASA in the Apollo Era*.⁷ In this chapter he not only devises and develops the support, coordination, rivalry idea for NASA-DoD relations and applies it to the period 1959-1963, he also has case studies of the Gemini-MOL interaction and the division of labor in early communications satellites. The current study proposes to extend this coverage both in time (before 1959 and after 1963) and in subjects (looking at all five of the human spaceflight projects). The second useful scholarly work is Walter McDougall's Pulitzer-prize-winning . . . *The Heavens and the Earth*.⁸ McDougall's political history of the space age from its beginning until approximately the early Johnson administration is invaluable in illustrating the role of prestige in each president's decision-making,⁹ as well as the often hidden but nevertheless crucial impact on space

⁷ Levine, 211-237.

⁸ See McDougall above.

⁹ There is an unpublished dissertation that focuses solely on analyzing how the quest for prestige impacted Eisenhower's and Kennedy's space policy. See Derek W. Elliott, *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963* (Ph.D. disserta-

policy exercised by the quest for legalized overflight of reconnaissance satellites. This dissertation will attempt to narrow McDougall's focus by examining only the American space program, only the human spaceflight projects, but will extend the time frame so as to include the MOL.

Finally, perhaps the most valuable scholarly work relevant to this dissertation is John Logsdon's *The Decision to Go to the Moon*.¹⁰ The primary focus of Logsdon's book is how and why Kennedy decided, in a search for prestige, to reorient American space policy in the spring of 1961 toward the goal of a lunar landing by the end of the 1960s. Logsdon not only does this admirably but has a cogent discussion of space policy in the Eisenhower administration. This dissertation's aim is to examine a longer period of time and additional human spaceflight projects but in much less detail than does Logsdon's book.¹¹

Given the importance of the concept of prestige to this work, a definition is in order. The standard dictionary version defines it as "1. The level of respect at which one is regarded by others; standing. 2. A person's [nation's] high standing among others; honor or esteem. 3. Widely recognized prominence, distinction, or importance."¹² Vernon Van Dyke, an early scholar of the space age, honed this and defined prestige in the context of geopolitical relations as "a reputation abroad for four qualities: (1) the pursuit of goals that are creditable and that respond to the challenges of the time; (2) the capacity to achieve the goals; (3) the necessary determination to achieve them, provided it can be done responsibly

tion, George Washington University), 1992. However, while relatively comprehensive in its coverage, Elliott does not really go much beyond McDougall's book conceptually.

¹⁰ John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass. and London, England: The MIT Press), 1970.

¹¹ It should be noted that the question of NASA-DoD relations will by no means be exhausted by this dissertation focusing on the questions of prestige, the cold war, and human spaceflight from 1957 to 1969. At least a volume, if not more, could be devoted to the NASA-DoD relationship *after* 1969, focusing on the development of the space shuttle. In addition, for the 1957-1969 period, entire monographs could be prepared on other aspects of the NASA-DoD relationship than human spaceflight such as communications satellites, launch vehicles, and the development of a worldwide system of ranges and tracking and data acquisition networks. Finally, chapters could be written on meteorological satellites, geodetic satellites, navigation satellites, and bioastronautics/life sciences research and development.

¹² *The American Heritage College Dictionary*, 3rd ed. (Boston and New York: Houghton Mifflin Company, 1993), 1083.

... and (4) an assured future, in which the other qualities making for prestige will be preserved if not enhanced."¹³ Van Dyke went on to distinguish international prestige from national pride by defining the latter as a "gratification stemming from actual or confidently anticipated achievement."¹⁴ The nuances of this distinction are not terribly important for this dissertation because it proposes to collectively examine how both prestige and pride together impacted presidential space policy making and in turn the human spaceflight projects. It is interesting to note that Van Dyke's conclusion was that pride was in fact more important because "... people who think they have a legitimate basis for pride can live without prestige or can live in the hope and expectation that what leads to pride will also give prestige in time. But we cannot live with ourselves without pride. We cannot tolerate humiliation w/out making as great an effort as is necessary to overcome it."¹⁵ Exactly what level of effort Eisenhower, Kennedy, and Johnson exerted will be the launching pad for this dissertation.

Eisenhower Administration

Nine main chapters plus this introduction and a conclusion form this dissertation. Chapter two will examine the salient trends and policies that were emerging even before Sputnik's launch on October 4, 1957. The civilian-military bifurcation was already evident before Sputnik; so was the use of the new civilian program as a sort of smokescreen or "stalking horse" for the pursuit of the principle of a legal right of overflight for reconnaissance satellites. Thus it is nonsensical to start of history of NASA-DoD relations at the beginning of NASA's operations in October 1958 or even at the launch of Sputnik. It is necessary to examine important developments from earlier in the Eisenhower administration. Three are of particular importance.

First is Eisenhower's philosophy of government often referred to as the "Great Equation." He defined this as the effort "to sustain a national determination to defend freedom with all we have, to devise and maintain indefinitely a military posture of such effectiveness that the Communists will abandon any

¹³ Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana, IL: University of Illinois Press, 1964), 119-120.

¹⁴ *Ibid.*, 136.

¹⁵ *Ibid.*, 271-72.

thought of all-out military attack against us or our allies, and to support this military capacity so prudently as to avoid undermining our economic soundness. We need an adequate defense, but every arms dollar we spend above adequacy has a long-term weakening effect upon the nation and its security."¹⁶ This balancing act had as a necessary presupposition that the USSR did, in fact, present a challenge that had to be met: "Communism, no matter how it may be described or disguised, requires dictatorship as a condition of its existence." The Communist leaders have concluded "... that the perpetuation of their doctrine depends upon the total destruction of individual liberty. . . . Communists embrace every kind of tactic to gain their fundamental objective, the domination of the earth's peoples. . . . They use force, the threat of force, economic pressure and penetration, deceit, blackmail, distortion, propaganda, bribery and lies to attain their ends, all with the sanction of their doctrine."¹⁷ The question for Eisenhower was therefore not whether the Soviet Union had to be contained or whether the United States should compete with the USSR. The question was whether or not space exploration, and in particular human spaceflight, was the appropriate means to do so. The post-Sputnik answer would be no.

The second pre-Sputnik trend of importance was the beginning of a civilian space program and creating a cogent space policy behind it. The Vanguard satellite was announced July 1955 and presented as a civilian, scientific endeavor, despite the fact that the Naval Research Laboratory (NRL) would supervise its construction, assembly, and launch. But this was only the tip of the iceberg. In February of 1955 the top secret report of a panel Eisenhower had created in March 1954 to assess the danger of a surprise attack against America made its report. The report recommended pursuing action to establish the principle of the freedom of space: "The present possibility of launching a small artificial satellite into an orbit about the earth presents an early opportunity to establish a precedent for distinguishing between 'national air' and 'international space', a distinction which could be to our advantage at some future date when we might employ larger satellites for intelligence purposes."¹⁸

¹⁶ Dwight D. Eisenhower, *Waging Peace: 1956-1961* (New York: Doubleday & Company, Inc., 1965), 622.

¹⁷ *Ibid.*, 625.

¹⁸ National Security Council (NSC), June 8, 1955, Comments on the Report to the President by the Technological Capability Panel of the Science Advisory Committee, folder: NSC 5522 - Technologi-

This recommendation was quickly translated into official United States policy by means of National Security Council document (NSC) 5520 which said, "Considerable prestige and psychological benefits will accrue to the nation which first is successful in launching a satellite. . . . Furthermore, a small scientific satellite will provide a test of the principle of 'Freedom of Space'. . . Preliminary studies indicate that there is no obstacle under international law to the launching of such a satellite." NSC 5520 recommended the initiation within the DoD of a program ". . . to develop the capability of launching a small scientific satellite by 1958, with the understanding that this program will not prejudice continued research directed toward large instrumented satellites for additional research and intelligence purposes, or materially delay other major Defense programs." This small scientific satellite program designed to establish the freedom of space principle would be conducted under the International Geophysical Year (IGY) "in order to emphasize its peaceful purposes."¹⁹

The third pre-Sputnik trend was the translation of these policy initiatives into an actual programs: the Vanguard satellite managed by the NRL and the Air Force's WS-117L (weapon system) re-

cal Capabilities Panel (2), box 16, Policy Papers subseries, NSC series, Office of the Special Assistant for National Security Affairs, Records: 1952-1961, White House Office, Dwight D. Eisenhower Library (DDEL), S5. The final report of the TCP was actually released February 14, 1955. To this day, however, Part V "Intelligence: Our First Defense Against Surprise", pages 133-152 is still classified in its entirety, including subsections 8. Scientific Techniques in Intelligence, 10. Satellites, 11. Information Retrieval, and 13. Recommendations. However, the author discovered at DDEL this recently declassified June 1955 NSC document which contains large citations from the TCP report, including the recommendations on intelligence gathering by means of reconnaissance satellites.

¹⁹ NSC 5520, U.S. Scientific Satellite Program, May 20, 1955, Space Policy Institute Archives (SPI) document 86, pp. 3, 6. The portions of this document dealing with reconnaissance satellites and the principle of freedom of space were only fully declassified in 1996. It should be noted that the author consulted the central SPI archives at George Washington University for this and all subsequent documents cited as "SPI document xxx." However, subsequently many of the most important documents from the SPI collection have been published in part or in full in John M. Logsdon, w/Linda J. Lear, Janelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995) or in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996). These volumes are part of a series which collects the seminal documents in space history. They are invaluable volumes which also contain cogent explanatory essays by the field's leading scholars. Those documents subsequently included in *Volumes I and II* which the author originally examined in the SPI are cited in this dissertation as from the particular volume for ease of scholarly access. "SPI document xxx" thus denotes documents in the SPI archival collection but not in *Volumes I or II* or portions of a document not fully reprinted in *Volume I*. Some portions of NSC 5520 are available in *Volume I*, 308-313.

connaissance satellite. The Air Force's main think tank, the Rand Corporation, had conducted many studies since the end of World War II regarding the feasibility of conducting photography from a space platform for the purposes of reconnaissance. However, not until March 1955 did the Air Force issue a formal General Operational Requirement No. 80 for what would soon become 117L and even then only budgeted three million dollars for 1956. Nevertheless, by the time of Sputnik, America had a space program consisting of distinct and separate military and civilian elements: in addition the civilian element was largely devoted to paving the legal pathway for the military reconnaissance satellite.

Chapter three will examine how the United States responded to Sputnik between its launching in October 1957 and the formal commencement of NASA operations in October 1958. In essence during this year, the Eisenhower administration created NASA as the home for civilian space exploration activities designed to emphasize the space for peace principle: the dual civilian and military space program was officially institutionalized. The National Aeronautics and Space Act of 1958 was the enabling legislation which stated, "The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind" and that

such activities shall be the responsibility of, and shall be directed by, a civilian agency exercising control over aeronautical and space activities sponsored by the United States, except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States) shall be the responsibility of, and shall be directed by, the Department of Defense; and that determination as to which such agency has responsibility for and direction of any such activity shall be made by the President. . . .

The Space Act went on to state that one of the goals of American space policy was to preserve for the United States a role as a leader in space, not necessarily the leader. Finally, the Space Act enjoined NASA to make available to the DoD "discoveries that have military value or significance."²⁰ This language did not come easily. It was not included in the Eisenhower Space Act as submitted on April 2, 1958 and resulted only from Congressional action and the testimony of concerned DoD officials, both uniformed and civilian.

²⁰ National Aeronautics and Space Act of 1958, as reprinted in John M. Logsdon et. al, *Exploring the Unknown*, ibid., 335.

The year after Sputnik had other important organizational developments. Eisenhower tried to bring an immediate sense of order to the military space program by creating the Advanced Research Projects Agency (ARPA). ARPA was also given responsibility for civilian space projects until NASA began operations. The organizational proliferation did not stop there, however. In addition to NASA, ARPA, and the Air Force space programs, by the end of 1958 Eisenhower had created another layer of bureaucracy in the Office of the Secretary of Defense (OSD) called the Director of Defense Research and Engineering (DDR&E) to bring a sense of order to a situation Eisenhower believed involved unnecessary duplication and proliferation of space projects.

Chapters four and five will explore how this organizational situation was clarified over the course of the rest of Eisenhower's second term and how the civilian-military division of effort was made permanent. The continuity of Eisenhower's philosophy is apparent. He continued to resist efforts to create crash programs designed to generate spectacular, prestige-oriented space achievements. His desire to limit government expenditures and achieve balanced budgets while maintaining an adequate defense structure continued to be paramount in his guidance of the space program. He assigned the human spaceflight mission to NASA because the Air Force could not articulate a clear military rationale for it. Further, he scoffed at proposals for sending men to the moon. At a December 20, 1960 NSC meeting Eisenhower's NASA Administrator T. Keith Glennan declared, "He [Glennan] had already decided not to embark on a full-scale man-in-space program beyond MERCURY."²¹

At this same meeting a report was delivered explaining that sending a man to the moon would cost between \$33.5 billion and \$46 billion. Eisenhower was aghast and said that "like Isabella, we were hocking our jewels for this purpose" if he were to authorize such a project. The president explained how "... the SPUTNIK complex impelled us to do everything yesterday. . . . He had to think about the country

²¹ Memorandum of Conference, Subject: Discussion at the 470th Meeting of the NSC, December 20, 1960, dated December 21, 1960, folder: 470th Meeting of the NSC, box: 13, NSC subseries, Ann Whitman series, DDEL, 2. It should be noted that citations from the plethora of memoranda of conferences, memoranda of discussions, etc. extant from the Eisenhower administration are citations from the author of the document who is paraphrasing the speaker in question. Such citations thus do not necessarily represent the direct words of the speaker (thought they may) but rather the paraphrasing of the author of the document.

as a whole, the economy, and the other demands on the budget. He believed it might be necessary to establish an annual budgetary ceiling for space activities. . . . The President believed that he could use \$1 billion to better advantage on some other aspect of the cold war. . . . The President said he was ready to say that he saw no scientific or psychological reason for carrying the man-in-space program beyond the MERCURY program. He thought the idea of a man on the moon was sheer Buck Rogers fiction."²²

The balance of chapters four and five will explain how, in this environment of presidential skepticism, the NASA-DoD institutional relationship began to simultaneously demonstrate aspects of support, coordination, and rivalry. NASA's Project Mercury simply could not have taken place without the use of Air Force ballistic missiles converted into space boosters, without the Air Force's launch complexes and tracking stations, without military test pilots used as astronauts, and without Air Force management expertise. Nevertheless, the Air Force was not satisfied with a role limited to support or coordination. It had its own nascent human spaceflight program in the Eisenhower administration called Dynasoar. While this program was relatively small from the financial perspective during Eisenhower's tenure, with "only" \$58 million dollars released for Phase I in August 1960,²³ it represented the Air Force's only hope for a human presence in space. Its status under Eisenhower was tenuous at best.

The final point of chapter 5 will be to briefly explain the emergence of the National Reconnaissance Organization (NRO). While not an organization directly involved with human spaceflight, it must be discussed in this context nonetheless. It was created in August 1960 to bring a sense of managerial order to the production, use, and management of American reconnaissance satellites. In it, the Air Force and CIA were brought together under the leadership of civilian officials to conduct reconnaissance from unmanned space platforms.²⁴ With its creation, the organizational structure of the American space pro-

²² Ibid., 4-5.

²³ Carl Berger, *The Air Force in Space: Fiscal Year 1961* (Washington, DC: United States Air Force Historical Division Liaison Office (USAF HDLO), 1966), 51. "Small" is used in the sense of relative to other DoD programs \$58 million is not a significant amount of money and in the sense of the Kennedy administration would spend almost a billion dollars before its cancellation in December 1963.

²⁴ The very existence of the NRO was not officially declassified until 1992. Concrete information concerning its establishment and subsequent programs is still extremely limited. The only exception is the recent wholesale declassification of the NRO's first generation reconnaissance satellite program, CORONA. See Kevin C. Ruffner, Editor, *CORONA: America's First Satellite Program*, CIA Cold War

gram was complete. NASA would conduct the 'peaceful' program of scientific exploration. The Air Force conducted the vast majority of military operations in space, though it felt circumscribed by the skepticism of the Eisenhower administration and various OSD officials and had to share authority for the reconnaissance mission with the NRO. As Logsdon has explained, "As the development of government space activities during the 1960s and 1970s continued, the separation between the three components of government activity - civilian, military, and intelligence - became quite pronounced," each with its own separate and distinct institutional structure and culture.²⁵

Kennedy Administration

Chapters six through eight will analyze the Kennedy era of NASA-DoD relations. Chapter six will explain Kennedy's philosophy of space exploration and the role prestige played in his drastic reorientation of the American space program to focus on the lunar landing, something which Eisenhower explicitly rejected. The actual period of January through May 1961 need not be examined in detail due to the comprehensive nature of Logsdon's treatment.²⁶ Initially Kennedy seems not to have placed a great deal of importance upon space exploration. However, after the humiliation of the Bay of Pigs fiasco and of the Soviets orbiting the first human, Yuri Gagarin, around the earth in April 1961, the question of space and prestige quickly moved to the top of Kennedy's agenda. He tasked Vice President Lyndon Johnson on April 20, 1961 to make "an overall survey of where we stand in space" and answer the questions: "Do we have a chance of beating the Soviets" in space and if so how? Kennedy asked, "Is there any other space program which promises results in which we could win? . . . Are we working 24 hours a day on existing programs. If not, why not? . . . Are we making maximum effort?"²⁷ Johnson replied after con-

Records, CIA History Staff, Center for the Study of Intelligence (Washington, DC: USGPO, 1995). Beyond this, virtually no official primary source information is available on the NRO.

²⁵ John Logsdon, "The Evolution of Civilian Space Exploitation," *Futures, The Journal of Forecasting and Planning* 14 (October 1982): 397. Logsdon should be credited as the first scholar to clearly point out the three-fold institutional structure of the United States space program in the open literature.

²⁶ See note 10 above.

²⁷ John F. Kennedy, Memorandum for Vice President Lyndon B. Johnson, April 20, 1961, *Exploring the Unknown, Volume I*, 424.

sulting with a wide variety of civilian and military leaders that landing a man on the moon and safely returning him was the appropriate goal for the American space program. He passed to Kennedy the recommendations made by NASA Administrator James Webb and Secretary of Defense Robert McNamara which stated, "This nation needs to make a positive decision to pursue space projects aimed at enhancing national prestige. . . . The non-military, non-commercial, non-scientific but 'civilian' projects such as lunar and planetary exploration are, in this sense, part of the battle along the fluid front of the cold war."²⁸

Kennedy accepted this and on May 25, 1961 declared it was

time for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to the future on earth. . . . For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last. . . . We go into space because whatever mankind must undertake, free men must fully share. . . . First, I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth.²⁹

During the two-and-a-half years remaining in Kennedy's term, some actions caused officials to question if Kennedy's commitment to space for prestige remained strong. In a September 1963 United Nations General Assembly speech he offered to make the lunar landing effort a joint United States-USSR project. Nevertheless, in a speech he delivered the day before he was assassinated he said, "The space program stands on its own as a contribution to national strength. . . . I think the United States should be a leader. A country as rich and powerful as this which bears so many burdens and responsibilities, which has so many opportunities, should be second to none."³⁰ Prestige appeared to be Kennedy's motivating factor for space policy to the end.

Chapter seven will explain how this heightened presidential concern for using space for prestige translated into vastly greater financial resources and political clout for NASA. NASA's move toward in-

²⁸ James Webb and Robert McNamara, Memorandum for Vice President Lyndon B. Johnson, "Recommendations for Our National Space Program: Changes, Policies, Goals", May 8, 1961, *Exploring the Unknown, Volume I*, 444. Emphasis in original (actual document (SPI document 300) has the sentence underlined: *Exploring the Unknown* reprint has it in italics).

²⁹ John F. Kennedy, Special Message to the Congress on Urgent National Needs, May 25, 1961, *Public Papers of the Presidents, 1961*, (Washington, DC: USGPO), 403-404.

³⁰ John F. Kennedy, Remarks in San Antonio at the Dedication of the Aerospace Medical Center, *Public Papers of the Presidents, 1963* (Washington, DC: USGPO), 883. The speech Kennedy was scheduled to give in Austin, TX on the day he was murdered also strongly made these points. See this same source, 897ff.

dependence from DoD that began under Eisenhower accelerated during the Kennedy administration. DoD continued to support NASA in the Mercury and Gemini programs but in the Apollo program DoD's role decreased (but did not disappear) as NASA's own managerial capabilities and infrastructure matured. One scholar has even concluded, "By 1963. . . the Air Force needed NASA almost as much as NASA needed the Air Force."³¹ There continued to be tension of course. Webb's biography reports that Webb and McNamara met regularly for lunches before and during the Apollo decision period but at one such luncheon after the decision "McNamara lectured Webb, so offending the NASA administrator that he and [Associate Administrator] Seamans walked out, and the regular lunches were discontinued." Thereafter Webb and McNamara dealt with each other as little as possible and communicated only through surrogates.³²

Equally important to the human spaceflight equation, however, was the tension within the DoD between the Air Force enthusiasts for space-based military systems, and OSD officials from McNamara down who were skeptical of the requirements for such projects. McNamara regularly stated that before he approved any military space project it would have to demonstrate two qualities: lack of duplication with NASA's efforts and an ironclad promise to enhance national security. Barring this, he refused approval. This so incensed the Air Force space officers responsible for space that their leader, General Bernard A. Schriever, commander of Air Force Systems Command, stated

Unfortunately, in my opinion, Mr. McNamara had no concept of management. He didn't understand research and development. . . . He demanded all kinds of loyalty, but he dispensed no loyalty down. . . . So if I seem to have little respect for Mr. McNamara, that's precisely correct. I didn't have while I was on active duty, and I don't have today. I think that he did many things that we're still suffering from and will suffer from for many, many years to come.³³

³¹ Arnold S. Levine, "Management of Large-Scale Technology", 48, in Roland, see note 1 above.

³² W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 240, note 56. Robert Seamans, at the time NASA's Associate Administrator, confirmed this account in an oral history interview with this dissertation's author in 1996, referring to "the black luncheon."

³³ June 20, 1973 oral history interview of General Bernard A. Schriever, K239.0512-676. Air Force Historical Research Agency (AFHRA), Maxwell Air Force Base (AFB), AL. 36-37. Systems Command was responsible for the design, planning and acquisition of all Air Force weapons systems, including space-based systems.

This two-fold tension, between NASA and the DoD and within the DoD between OSD and the Air Force, is the defining characteristic of chapter 8. It will be the first of two chapters (the second being chapter 10 for the Johnson administration) to focus solely on the specific human spaceflight projects. During the Eisenhower administration the projects were either nonexistent or too young to have significant developments. After 1961 this was no longer true. Therefore chapter 8 will detail the complex interaction between the Air Force's Dynasoar, MOL, and NASA's Project Gemini.

The Kennedy administration initially increased funding for the Dynasoar significantly above that programmed by the Eisenhower administration. However, by 1962, McNamara began to question whether or not the requirement the Air Force had in mind for the Dynasoar might in fact be met by NASA's Gemini. In November 1962 he proposed to Webb that the DoD actually take over management of Gemini. NASA was able to rebuff this foray but Webb and McNamara did sign an agreement in January 1963 increasing the Air Force's level of participation in Gemini so that more DoD experiments (almost all of which were related to reconnaissance) could be performed aboard NASA's Gemini flights. From this point forward Dynasoar's future became increasingly clouded.

By the beginning of 1963, the DoD had spent \$240 million on Dynasoar, a sum almost equal to the entire cost of the soon-to-be completed Mercury program, and had only a full-scale mockup to show for its investment. Estimates were that another \$1.3 billion would be required to complete the program.³⁴ McNamara tasked his DDR&E Harold Brown in January 1963 to "review in detail the DYNASOAR Program In particular, I am interested in considering the relationship of DYNASOAR to GEMINI and the extent to which the former will provide us with a valuable military capability not provided by the latter" and "I am interested in the extent to which the Gemini Program as presently conceived by NASA will meet our military requirements."³⁵

³⁴ Elliott, 210.

³⁵ McNamara to Harold Brown, two memoranda, January 18 and 19, 1963, folder: 6 - 1963, box B129, Curtis LeMay papers, Library of Congress (LoC), p. 1 of both.

The next eleven months, culminating in the December 10, 1963 cancellation of Dynasoar and initiating the MOL's study phase, is the intricate story of McNamara becoming convinced that NASA's Gemini could perform Dynasoar's mission. But the Gemini capsule could not do these reconnaissance-related missions alone: it had to be coupled with a cylindrical laboratory (MOL) in which two Air Force officers would live for thirty days at a time in a pressurized, "shirt sleeve" environment, peering down at the surface of the earth through a giant telescope. While not technically defined as a space station, it did raise some concerns within NASA that the DoD was encroaching on NASA territory. Webb and McNamara conducted another delicate dance in which they forged an agreement on space station studies and future responsibilities. So shortly after the premature end of the Kennedy administration the Air Force's first human spaceflight project, Dynasoar, was gone, but the Air Force could still focus its energies on the MOL and hope to establish a manned military presence in space through it.

Johnson Administration

Chapter nine will combine a look at the space for prestige philosophy of the Johnson administration and at the institutional climate between NASA and the DoD. There is enough continuity from the Kennedy to the Johnson administrations to combine these two topics in one chapter. First, Johnson did continue Kennedy's commitment to the lunar landing. Despite a steadily declining NASA budget during his full term, Johnson ensured that Project Apollo had adequate funding to land a man on the moon and return him before the end of the decade.³⁶ The mushrooming expenses of Johnson's social welfare programs, collectively called the Great Society, coupled with the ever-increasing costs of the Vietnam War,³⁷ meant Johnson's space policy involved little beyond ensuring America would reach the moon by the end of the 1960s. While Johnson's rhetoric often contained such statements as "But the need of man - the

³⁶ NASA's spending, in inflation-adjusted, 1993 equivalent dollars, peaked in 1965 at \$24.1 billion and declined by 1969 to \$15.7 billion. DoD space-related spending held constant during this period at a level between \$7.1 and \$7.9 billion. See NASA, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities* (Washington, DC: USGPO, 1996), A-31.

³⁷ One estimate of the Vietnam war's cost by the end of Fiscal Year (FY) 1970 is \$108.5 billion. See Edward C. Ezell, "The Apollo Program: History Must Judge," in Richard P. Hallion, editor, *Apollo: Ten Years Since Tranquillity Base* (Washington, DC: Smithsonian Institution Press, 1979), 28.

need of these times - is not for arms races or moon races, not for races into space. . ."³⁸ one Johnson scholar accurately summarized. "Johnson never abandoned his determination to beat the Russians to the moon, but the course of events, especially the Vietnam War, forced him to impose some very real limits on the American effort in space."³⁹

The NASA-DoD relationship had also largely stabilized by the end of the Johnson presidency. They still coordinated their programs. DoD still provided support to NASA, though at a much lower level in the Apollo program, and NASA even had a research effort supporting the DoD's activities in Southeast Asia. There was some degree of tension over questions such as the continuing drain of military officers being assigned to NASA or how much NASA would reimburse DoD for use of DoD facilities. But as one analyst remarked, these disputes were often "hopeless, but not serious."⁴⁰ And some rivalry continued, mostly focused now not on the question of one organization trying to take over the other but on the specific project level of space stations. NASA's Apollo follow-on program was the Apollo Applications Program (AAP). The three Skylab missions flown in 1973 were the most well known descendants of AAP. During the Johnson administration, however, NASA had much grander plans for AAP. Tens of flights were scheduled to include stations in earth orbit and repeated visits to the moon. In this environment, many in Congress and elsewhere wondered exactly what MOL could do that AAP could not.

It is this MOL-AAP interaction that forms the core of chapter 10, the second chapter focusing exclusively on the human spaceflight projects. The difficulties continued between McNamara and his OSD staff and the Air Force, this time concerning MOL. While he authorized the Air Force to study the MOL and make preliminary designs in December 1963, it was not until August 1965 that McNamara felt the MOL was sufficiently defined to present it Johnson for approval. Again, the missions that made the difference were reconnaissance oriented. In short order, however, charges of MOL-AAP duplication

³⁸ Lyndon B. Johnson, Commencement Address at Catholic University, June 6, 1965, *Public Papers of the Presidents, 1965* (Washington, DC: USGPO, 1966), 644.

³⁹ Robert A. Divine, "Lyndon B. Johnson and the Politics of Space," chap. in his *The Johnson Years, Volume Two: Vietnam, the Environment, and Science* (Lawrence, KS: The University of Kansas Press, 1987), 233.

⁴⁰ Levine, 237.

arose. The DoD and NASA conducted numerous studies to explore if Apollo-Saturn equipment could be used for MOL missions and if MOL-Gemini equipment could be used for AAP missions. The findings were always negative but since the MOL's *raison d'être* was reconnaissance, and this mission was highly classified, the charges of duplication were not answered in public and often not to Congress either, thereby casting doubt on MOL's long-term viability.⁴¹

AAP limped through the conclusion of the Johnson administration on relatively anemic funding levels. Its ultimate result was the three Skylab missions in 1973 using Apollo-Saturn equipment made surplus by the cancellation of the last three lunar landing missions, Apollo 17 through 20.⁴² MOL also survived the Johnson administration but was canceled by Richard M. Nixon within six months of his inauguration. The MOL's demise was not solely attributable to the perception in some quarters that it duplicated NASA's AAP. Two other factors were also important. First, pressures for reducing the DoD budget only accelerated during Nixon's administration as the Vietnam war continued and inflation picked up. The MOL was the largest single item in the DoD's research and development budget. Second, the NRO's third and fourth generation of reconnaissance satellites already were so successful or were predicted to be so that these robotic satellites largely superseded MOL's role. Thus the real threat to MOL from the duplication perspective was not NASA, but the NRO. This was very difficult to fully understand, both then and now, because of the secretive nature of both the NRO *in toto* and of the MOL's mission.

⁴¹ It was not until September 1993 that the Air Force declassified the publication describing thirteen of the fifteen primary MOL experiments. Even this once-classified document did not detail the MOL's two most important experiments and the ones directly related to reconnaissance: P-14 Antenna Experiment for assembly of a large antenna in space designed to gather electronic emanations such those originating at radar sites and communications facilities: this is collectively called ELINT or electronic intelligence; and P-15 Optics Experiment for use of large telescopes with advanced optics serving as cameras to photograph selected areas of the earth's surface and transmit the resulting data back to ground stations. See Headquarters, Space Systems Division, Air Force Systems Command, *Primary Experiments Data for the Manned Orbiting Laboratory System (MOL) Program*, March 1965, SSMM-67, SPI unnumbered document, 164.

⁴² For a history of Skylab and its predecessor program AAP see W. David Compton and Charles D. Benson, *Living and Working in Space: A History of Skylab*, NASA SP-4208 (Washington, DC: USGPO, 1983).

By way of conclusion, Levine succinctly summarizes that the history of NASA “. . . can be charted in terms of NASA’s ability to design its programs, procure its hardware, and support its spacecraft without overt interference from the military. . . .without a strong assertion of independence, NASA would have become what the services anticipated on the eve of the Space Act - a research agency supporting military projects.” He adds, “Perhaps the most remarkable thing about the NASA-DOD relationship is not that it worked so well, but that so often practice was better than theory, and mutual interest overrode the funding the funding and duplication controversies.”⁴³ Despite the presence of tension and rivalries, NASA-DoD support and coordination were vitally important for the first the American space program in the 1950s and 1960s. Without both of these organizations American almost certainly would not have reached the moon in the 1960s, and perhaps never at all.

It is not accurate, then, to state NASA was dominated by the DoD or served as “a kind of puppet government under the Department of Defense” with a status largely limited to “the decorous front parlor of the space age in order to reap public support for all space projects and give Defense Department space efforts an effective ‘cover.’”⁴⁴ Nor does the evidence merit the assessment that “The [military] services deliberately attempted to and succeeded in subverting the nature and direction of this country’s civilian space program.”⁴⁵ More careful scholars explain that the structure of civil-military relations in the American space program was dominated by civilian leaders in the executive branch from the Presidents through the Secretaries of Defense and down to the service secretaries. As part of this structure, NASA “. . . served as an excellent smoke-screen for the DOD’s military space activities, especially for reconnaissance missions. NASA’s civilian mission, therefore, dovetailed nicely into cold war rivalries and priorities in national defense.”⁴⁶ It was not a matter of conspiratorial domination but of a carefully coordinated, civilian controlled, rationally structured three-way (NASA, DoD, NRO) institutional space program.

⁴³ Levine, 270, 237.

⁴⁴ Erlend A. Kennan and Edmund H. Harvey, *Mission to the Moon: A Critical Examination of NASA and the Space Program* (New York: William Morrow & Company, 1969), 212, 217.

⁴⁵ Stephen I. Grossbard, *The Civilian Space Program: A Case Study in Civil-Military Relations*, (Ph.D. dissertation, University of Michigan, 1968), 3.

An equally important element was the environment established by each of the three presidents and their attitude toward using space for the pursuit of prestige. One noted presidential scholar remarked, "In the era of the Cold War we have practiced 'peacetime' politics. What else could we have done? Cold War is not a crisis; it becomes a way of life."⁴⁷ In varying degrees, each president placed the space program in a cold war context. Eisenhower did not subscribe to the notion that human spaceflight programs should be used to garner prestige in a competitive environment. Kennedy did and set America on its way to the moon. However, even when Kennedy reversed Eisenhower's aversion to such a concept and Johnson maintained the space for prestige concept, the underlying importance of guaranteeing freedom of transit for American reconnaissance satellites stands as a constant in American space policy from Sputnik to Apollo.

⁴⁶ Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 35.

⁴⁷ Richard Neustadt, *Presidential Power and the Modern Presidents: The Politics of Leadership from Roosevelt to Reagan* (New York: The Free Press, 1990), 5.

2. Pre-Sputnik Trends of Importance

The weapons of today are the museum pieces of tomorrow.¹

He [Eisenhower] tried in every way to legitimize overhead reconnaissance and hoped to gradually gain Soviet acceptance of it. . . . There was a sense of extraordinary urgency in getting good pictures of the entire USSR.²

It was felt that scientific satellites which would be clearly nonmilitary and clear inoffensive might help to establish the principle that outer space is international space.³

The foremost historian of the military space program has divided Eisenhower's space program into three periods. From 1946 through 1954 were engineering analyses of satellites and evaluations of their feasibility. 1955 to 1957 saw the formulation of a national space policy, approval of separate scientific and military satellite projects, and the design and construction of the ballistic rockets necessary to launch earth satellites. 1958 to 1961 included the post-Sputnik organization of a national space program and assignment of space missions.⁴ This chapter will attempt to examine those events from the first two periods relevant to the emerging NASA-DoD relationship and human spaceflight projects. Chapters three through five will cover the third period.

¹ Army Air Forces Commanding General H. H. Arnold, November 1945, cited in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960, Volume I*, (Maxwell Air Force Base, AL: Air University Press, 1989), 219.

² Albert D. Wheelon, "CORONA: A Triumph of American Technology." Keynote address at the May 23-24, 1995 conference "Piercing the Curtain: CORONA and the Revolution in Intelligence," sponsored by the CIA's Center for the Study of Intelligence and the Space Policy Institute of George Washington, 3. Wheelon was the CIA's first Deputy Director for Science and Technology and was the chief architect of many of the CIA's reconnaissance satellites in the early 1960s, which flourished under his leadership.

³ Donald Quarles. Memorandum for the President. Subject: Earth Satellite. October 7, 1957. folder: Earth Satellites (1), box 7, Briefing Notes subseries, NSC Series. Office of the Special Assistant for National Security Affairs (OSANSA): Records, 1952-61, White House Office, DDEL, 1.

⁴ R. Cargill Hall, "Civil-Military Relations in America's Early Space Program." a paper delivered September 21, 1995 at a symposium sponsored by the Air Force Historical Foundation, "The USAF in Space: 1945 to the Twenty-First Century," Andrews AFB, MD, 3.

The Pioneers

The idea that the quest for international prestige should be a motive factor in space exploration did not appear until the cold war was in full bloom. The three pioneers in the field of astronautics thought space travel necessary because of the scientific knowledge that could be obtained and because of humanity's urge to explore. The Russian Konstantin.E. Tsiolkovsky (1857-1935), credited with the idea of liquid-fueled rockets and the design of reaction rocket engines, mused in 1896

To place one's feet on the soil of asteroids, to lift a stone from the moon with your hand, to construct moving stations in ether space, or organize inhabited rings around Earth, moon and sun, to observe Mars from a distance of several tens of miles, to descend to its satellites or even to its own surface, what can be more insane!? However, only at such a time when reactive devices are applied, will a new great era begin in astronomy: the era of more intensive study of the heavens. Does not the frightening huge force of gravity scare us more than it should?⁵

Tsiolkovsky's 1929 essay "Cosmic Rocket Trains" proposed the idea of linking rockets together for sequential firing, a concept known today as rocket stages. He declared, "The conquest of the solar system will not only give us energy and life . . . but will give us spaciousness which will be even more abundant."⁶ No concept of space for prestige was evident in the writings of this Russian mathematician.

Robert H. Goddard (1882-1945) was the American on the vanguard of astronautical thinking. This physics professor went beyond Tsiolkovsky in that he actually fabricated, experimented with, and launched rockets. In 1919 he published a paper that explained all the basic design details of a rocket using nitrocellulose smokeless powder as a propellant. He felt such devices were important because ". . . the most interesting, and in some ways the most important, part of the atmosphere lies in this unexplored region, a means of exploring which has, up to the present, not seriously been suggested." Goddard believed rockets were important because they could obtain information on the density, chemical composition, temperature, and extent of the atmosphere: "An important part of the atmosphere. . . has up to the present

⁵ K.E. Tsiolkovsky, *Works on Rocket Technology*, NASA Translation TT F-243, November 1965, from the Publishing House of the Defense Industry, Moscow, 1947, box: Works on Rocket Technology by K.E. Tsiolkovsky, shelf: III-B-7, NASA Historical Data Reference Collection (NHDRC), 95.

⁶ *Ibid.*, 250.

time has been considered inaccessible. Data of great value in meteorology and in solar physics could be obtained by recording instruments sent into this region."⁷

This theme of the scientific importance of space exploration continued throughout Goddard's work. After his first successful rocket flight on March 16, 1926 in which his liquid fueled rocket flew for 2.5 seconds, rose to 41 feet and traveled 64 miles per hour (mph), Goddard wrote, "Concerning commercial exploitation, I do not see at present any considerable commercial field, but believe that there are some very important scientific applications."⁸ After several more rocket tests, Goddard discounted the military applications of his invention, writing on October 7, 1929, "A development in pure science should surely not be allowed to become an instrument for promoting international ill will and misunderstanding."⁹ Despite his belief in the scientific merits of space exploration, Goddard died in August 1945 after serving as Director, Bureau of Aeronautics, Navy Department, developing variable thrust rocket motors for the United States Navy. By then his rockets had traveled at 700 mph to an altitude of 15 miles.¹⁰ The military and political realities concerning the uses of rocket technology in war were beginning to intrude upon the concepts of purely scientific research and development for astronautics. Nevertheless, the idea of using these devices in a prestige-oriented competition was not yet present.

The final pioneering thinker in the field of space exploration was the German Hermann Oberth (1894-1989). In his 1929 book he explored the possibilities of large orbiting stations with supply vehicles that could "recognize every detail on earth and could give light signals to earth through the use of appropriate mirrors. . . . their military value would be obvious." He also speculated about a massive network of satellite-based mirrors focusing huge amounts of solar energy back to earth which "would unfortunately have a great strategic value" due to their ability to "explode munitions factories, create tornadoes and

⁷ Robert H. Goddard, "A Method of Reaching Extreme Altitudes," originally published in *Smithsonian Institution Miscellaneous Collections*, vol. 71, No. 2, December 1919 and reprinted in Esther C. Goddard, editor, and G. Edward Pendray, Associate Editor, *The Papers of Robert H. Goddard* (New York: McGraw-Hill Book Company, 1970), three volumes. Citations are to vol 1, 340, 396.

⁸ *Ibid.*, vol II, 588.

⁹ *Ibid.*, 703.

¹⁰ Nathan C. Goldman, *Space Policy: An Introduction* (Ames, IA: Iowa State University Press, 1992), 4.

storms, destroy marching troops and their supplies, burn entire cities and in general cause great damage.”¹¹ He explored many other types of rockets: a meteorological rocket for upper atmosphere research; a “reconnaissance rocket [that] could be equipped with a motion picture camera to make it photograph the landscape before it;” a mail delivery rocket; a rocket airplane; and a projectile delivery rocket.¹² He even outlined a rocket that would make possible a 97-hour scientific expedition to the moon that would gather “geological knowledge of incalculable importance.” Oberth also posited military applications, however: “Perhaps it would be possible to drive missiles from the moon to the earth. Setting up electromagnetic guns and the cannon would be facilitated by the fact that seen from the moon, the earth always remains at the same place in the sky.”¹³ Therefore, Oberth foresaw a complex mix of scientific knowledge, commercial potential, and military applications springing from space exploration. However, nowhere in his theories is there any mention of space exploring serving as a geopolitical competitive tool for prestige enhancement.

World War II's Immediate Legacy

World War II (WWII) cemented the link between space technology and military applications. The two most important technological innovations from WWII, the atomic bomb and the ballistic missile, were married after this conflict and formed a union that made possible the emergence of the space age. The atomic bomb soon gave way to the hydrogen bomb. This smaller weapon could feasibly be placed on the ballistic rockets descended from Germany's V-2 to create an intercontinental ballistic missile (ICBM). Russia's first generation R-7 ICBM would carry Sputnik to orbit on October 4, 1957 and America's first satellite, Explorer, was launched by the Army's modified Jupiter intermediate range ballistic missile.¹⁴

¹¹ Hermann Oberth, *Ways to Spaceflight*, 1972 translation of *Wege zur Raumschiffahrt*, 1929, NASA TT-F-9227, Biographical series, Hermann Oberth file, NHDRC. 93-96.

¹² *Ibid.*, 363-371.

¹³ *Ibid.*, 515-516.

¹⁴ The Redstone would be the vehicle for the early Mercury unmanned flights. Manned Mercury flights were made on the Air Force's Atlas ICBM. All Gemini flights were made on the Air Force's Titan ICBM. NASA's first manned space booster not taken directly from the Air Force's stable of ICBMs was the Saturn family developed for the Apollo program. However, the Saturn program was started in the

The close link between civilian and military hardware at the heart of the space age's birth existed even before NASA was chartered. Only with the hardening of the cold war in the mid-1950s, however, would the final factor of prestige-oriented competition make its entry.

Institutional and bureaucratic links between civilian scientists in the nascent field of astronautics and the American military are also found in WWII. The Guggenheim Aeronautical Laboratory at the California Institute of Technology (GALCIT) was established in 1936 and in 1939 received its first federal contract for rocket research. During WWII it conducted studies and experiments for the Army Air Forces on rocketry and especially jet-assisted takeoff under such luminaries as Theodore von Karman, Frank Malina and Hsue-shen Tsien. GALCIT was renamed the Jet Propulsion Laboratory (JPL) in July 1944 because, as one scientist attested, "the word 'rocket' was of such bad repute that [we] felt it advisable to drop the use of the word."¹⁵ JPL continued its R&D under the Army and was transferred to NASA shortly after NASA began operations in 1958. German scientists such as Wernher von Braun brought to America under Operation Paperclip augmented America's wartime rocketry experience after WWII.¹⁶ Eventually, this group was integrated into the Army Ballistic Missile Agency, part of the Army Ordnance Missile Command. The ABMA would come under NASA's jurisdiction in 1960, again illustrating the close historical links between military R&D and America's civilian space program. From this WWII and postwar use by the United States military of American civilian and German scientists to perfect ballistic missiles and to begin to scientifically explore the upper atmosphere "... emerged the precedent for civilian gov-

Army Ballistic Missile Agency (which had previously developed the Redstone), which was then officially transferred to NASA in 1960.

¹⁵ Cited in Loyd S. Swenson, Jr., James M. Grimwood, Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201, (Washington, DC: USGPO, 1966), 16.

¹⁶ For a complete examination of the German ballistic missile program and an introduction to the subject of America's use of these scientists, see Michael J. Neufeld, *The Rocket and the Reich: Peenemünde and the Coming of the Ballistic Missile Era* (New York: The Free Press, 1995). Between 1946 and 1951 Von Braun and his approximately 100 colleagues test launched 67 captured and modified German V-2 ballistic missiles in Texas and New Mexico. "The result was a significant expansion of U.S. knowledge of rocketry." See Roger Launius, "Early U.S. Civil Space Policy, NASA, and the Aspiration of Space Exploration," in Launius, editor, *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, American Astronautical Society History Series, vol. 18 (San Diego, CA: Univelt, Inc., 1996), 68.

ernment scientists to provide scientific payloads for military rockets, and indeed was the genesis of a U.S. space science community.”¹⁷

However the decade after WWII should not be considered one of enthusiastic development of missiles, satellites, and space technology. The Air Force’s reconnaissance satellite was not approved until March 1955 and its budget was limited to \$3 million in 1956. Research and development (R&D) funds for ballistic missiles, the necessary precursor for any space program, are shown below, in millions of dollars:¹⁸

pre-1953	1953	1954	1955	1956	1957	1958
< \$1	3	14	161	515	1380	1349

Prior to Eisenhower’s inauguration therefore, the wherewithal did not exist to develop the boosters necessary to put anything into space. Why?

Because the scientists advising the government did not believe it was possible to create an ICBM. Vannevar Bush, head of the Research and Development Board in WWII and dean of the scientific community advising the federal government, testified to Congress in December 1945 concerning long-range ballistic missiles, “I don’t think anybody in the world knows how to do such a thing, and I feel confident it will not be done for a very long period of time to come.” He wished the American public “would leave that out of their thinking.”¹⁹ This skepticism was not entirely unfounded before the perfection of the hydrogen bomb in the mid-1950s. Before that atomic warheads weighed several tons and would have required a truly huge missile to transport them intercontinental distances.²⁰ American heavy bombers al-

¹⁷ Dwayne Day, “Invitation to Struggle: The History of Civilian-Military Relations in Space”, in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 235. For the complete story of this early civil-military interaction in the space sciences see David H. DeVorkin, *Science With A Vengeance: How the Military Created the US Space Sciences After World War II* (New York and Berlin: Springer-Verlag, 1992).

¹⁸ Robert A. Divine, *The Sputnik Challenge* (New York and Oxford: Oxford University Press, 1993), 29.

¹⁹ Cited in Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana, IL: University of Illinois Press, 1964), 10.

ready existed to fulfill this mission. In the post-WWII downsizing of the American military, there was little support for developing state-of-the-art technologies to meet a requirement already met by another weapon system.

Toward New Horizons, the Air Force's famous postwar assessment of future technologies briefly mentioned how V-2-type rockets might have their range increased by 30 times and how an artificial satellite was a "definite possibility," but did not further develop either thought, dropping these ideas in favor of stressing what could be done within the atmosphere and with winged aircraft.²¹ The Army Air Force's commanding general could discuss in November 1945 new weapons capable of launching projectiles 3000 mph from "true space ships, capable of operating outside the earth's atmosphere. The design is all but practicable today; research will unquestionably bring it into being within the foreseeable future."²² But the practical reality was that such ruminations would remain entirely theoretical until fusion technology made possible the hydrogen bomb during Eisenhower's first term and thus a warhead of much decreased size and weight and much increased explosive power. Only then could ICBMs be seriously considered, thereby laying the groundwork for both the civilian and military space programs. Quite possibly space boosters would have eventually been developed on their own merits. However, creating them as off-shoots of ICBMs probably made them available more quickly as a military by-product.

It is in this context of theoretical yearning but practical inhibitions that one must view the studies of satellites made before the early 1950s. These were conducted by the Navy Bureau of Aeronautics (BuAer) and by the Air Force's newly-created think tank, the Research and Development Corporation, or

²⁰ The Ivy series of weapons tests in the fall of 1952 indicated the feasibility of a hydrogen bomb; a series of tests over the next two years perfected the technology. Whereas an atomic bomb previously weighed approximately 9,000 pounds, hydrogen warheads would be approximately 1,500 pounds. See Charles S. Maier, "Science, Politics, and Defense in the Eisenhower Era," in George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology* (Cambridge, MA and London: Harvard University Press, 1976), xxxiii.

²¹ See Theodore von Karman, *Toward New Horizons: Science, the Key to Air Supremacy*, report to the General of the Army H.H. Arnold, HQ, Army Air Forces, December 15, 1945, ix, 4, 13, 25, as cited in Van Dyke, 10.

²² General H.H. Arnold's final war report, November 12, 1945, cited in Lee Bowen, *An Air Force History of Space Activities, 1945-1959* (Washington, DC: USAF HDLO, 1964), SHO-C-64/50, 29.

Project Rand.²³ The former concluded in November 1945: "In view of the recent progress in the field of rocket missiles it may prove advantageous to review the possibility of establishing a space ship in an orbit above the surface of the earth. . . . This orbit may prove more desirable for communications or for scientific observations."²⁴ In March 1946 the Navy requested the Air Force join its satellite studies but the Air Force preferred to launch an independent effort: a "joint program of evaluation, justification, and, if warranted, construction and operation. . . was not agreeable to the Army Air Force. As a result, it was agreed that the Army Air Force and the BuAer would conduct separate investigational programs. . . ."²⁵ The beginnings of interservice rivalry that would come to characterize the formative period of the space age were already emerging.

The Navy's studies continued and by 1947 indicated that "Satellite Test Vehicle operation is technically possible, and that it could be attained with a development program of a few years duration. . . . it also appears probable that a vehicle of military usefulness could be attained in an additional few years. Further, it seems possible that this later development could be adapted to manned operation." Tellingly, the Navy recommended "the possibility of extending basic knowledge through cooperation with civilian scientific groups, [which] indicate that a program for the satellite should be instituted."²⁶

Meanwhile, the Air Force had tasked Rand with a three-week deadline to study the issue of satellite feasibility. In a seminal report of May 1946 Rand conducted a technical and engineering analysis of the possibilities of an artificial earth satellite and concluded it was entirely feasible. This report also contained complete designs of two proposed vehicles. Rand stated

It is concluded that modern technology has advanced to a point where it now appears

²³ The best concise account of these early studies is R. Cargill Hall, "Early U.S. Satellite Proposals," *Technology and Culture*, Vol. IV, No. 4 (Fall, 1963): 410-434.

²⁴ United States Navy Bureau of Aeronautics, Investigation of the Possibility of Establishing a Space Ship In an Orbit Above the Surface of the Earth, A.D.R. Report R-48, November 1945, folder: Navy/BuAer: Earth Satellite Vehicle, DoD subseries, Federal Agencies series, NHDRC, 1-2.

²⁵ Minutes of meeting, 4th meeting of the Joint Research and Development Board of the War and Navy Departments, March 6, 1947, 2, *ibid.* This meeting in 1947 is summarizing events of a year earlier as well as recounting progress in early 1947. The Air Force did not become a separate service until passage of the National Security Act of 1947.

²⁶ *Ibid.*, 2-3.

feasible to undertake the design of a satellite vehicle. . . . Such a vehicle will undoubtedly prove to be of great military value. . . . There is good reason to hope that future satellite vehicles will be built to carry human beings. . . . The achievement of a satellite craft by the United States would inflame the imagination of mankind, and would probably produce repercussions in the world comparable to the explosion of the atomic bomb. . . .²⁷

Rand believed a satellite would cost \$150 million dollars and require 5 years of R&D. It recommended the Air Force contract with Rand to continue its effort toward a satellite because “. . . there is good reason to hope that future satellite vehicles will be built to carry human beings.”²⁸ It was not to be. This remarkably prescient report has correctly been called “prophetic.”²⁹ Nevertheless, support for an expensive new program, operating at the vanguard of science and technology, existed neither at the highest levels of the military services, nor in the civilian leadership of the War Department, nor at the presidential level.

The Navy dropped its satellite studies on June 22, 1948 after the Air Force continued to refuse to join it and as budgets became increasingly stringent. The best the Air Force could do was a policy statement in January 1948 stating, “The USAF, as the Service dealing primarily with air weapons - especially strategic - has logical responsibility for the Satellite. Research and development will be pursued as rapidly as progress in the guided missiles art justifies and requirements dictate. To this end the problem will be continually studied with a view to keeping an optimum design abreast of the art. . . .” A cover letter to this policy explained that “. . . the actual design, construction, and launching of an Earth Satellite vehicle is technically, although not economically possible. The passage of time, with accompanying technical progress, will gradually bring the cost of such a missile within feasible bounds.” The policy statement was recommended “. . . in order that the USAF maintain its present position in aeronautics and prepare for a future role in astronautics. . . .”³⁰ In addition to once again pointing to incipient interservice rivalry in this

²⁷ Douglas Aircraft Corporation, RAND Corporation, “Preliminary Design of an World-Circling Spaceship,” Report No. SM-11827, May 2, 1946, in John M. Logsdon w/Linda J. Lear, Janelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 236, 239.

²⁸ Ibid., 238.

²⁹ Hall, “Early U.S. Satellite Proposals,” 415.

³⁰ General Hoyt S. Vandenberg, Vice Chief of Staff of the Air Force, January 12, 1948. Cover letter is same date but not signed. SPI unnumbered document. John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil*

new field, the practical impact of this policy declaration was that Rand received a low level of funding to continue its investigation into the feasibility of various types of satellites and the missions they could perform.

The final word on the early post-WWII satellite studies is found in the first report of the first Secretary of Defense, James Forrestal. In 1948 this report stated, "The Earth Satellite Vehicle Program, which was being carried out independently by each military service, was assigned to the Committee on Guided Missiles for Coordination. . . The committee recommended that current efforts in this field be limited to studies and component designs. . ."³¹ This first public mention of the military satellite program caused bemused journalists to query, "Will America possess moons of war?"³² A cloak of silence descended on the subject and "Satellites were not publicly mentioned again until November, 1954."³³ Vannevar Bush's Research and Development Board's March 1948 final report agreed a satellite was technically feasible but concluded it had neither military nor scientific utility ". . . commensurate with the presently expected cost,. . . no satellite should be built until utility commensurate with the cost is clearly established."³⁴ President Harry S. Truman's attitude concerning satellites is seen in his later February 1956

Space Program, Volume II: Relations with Other Organizations, NASA SP-4407 (Washington, DC: USGPO, 1996), 272 reprints both the cover letter and Vandenberg's policy document. However, it incorrectly renders the word "economically" from the original document as "necessarily."

³¹ National Military Establishment, James Forrestal, Secretary of Defense, *First Report of the Secretary of Defense, 1948* (Washington, DC: USGPO, 1948), 129.

³² Futrell, *Volume I*, 541.

³³ John B. Hungerford, Jr., Major, USAF, *Organization for Military Space - A Historical Perspective*, Air Command and Staff College Report Number 92-1235 (Air University, Maxwell AFB, AL, 1982), 8. In November 1954 the DOD was pressed about its participation in the International Geophysical Year and tersely admitted that unspecified satellite studies were continuing. See Rip Bulkeley, *The Sputniks Crisis and Early United States Space Policy: A Critique of the Historiography of Space* (Bloomington, IN: Indiana University Press, 1991), 80.

³⁴ Report of the Technical Evaluation Group of the Committee on Guided Missiles of the Research and Development Board, March 29, 1948, cited in Bowen, 36.

characterization of Eisenhower's civilian Vanguard satellite as a lot of "hooley."³⁵ His administration also canceled all research into ICBMs in 1947.³⁶

Reconnaissance from Space?

At a very low funding level, the Air Force study effort under Rand continued throughout the early 1950s. Increasingly, these studies and the numerous conferences discussing them focused on the use of satellites for overhead photographic reconnaissance: "... all of them could agree by the early 1950s that the most valuable, first-priority use of a satellite vehicle involved one strategic application: a platform from which to observe and record activity on the Earth."³⁷ In 1949, one such Rand report's primary conclusion was that "... major intelligence secrets obtained through a visible or non-visible satellite. . . may produce results of a magnitude eclipsing all other possible uses of the vehicle. No other weapon or technique known today offers comparable promise. . ."³⁸ Even the crucial freedom of overflight question was touched upon as early as a January 1949 Rand conference discussing the reconnaissance implications of satellites. A political scientist asked, "There would be a legal point involved in its [a satellite's] use for reconnaissance purposes. Would not this violate sovereignty?" Another political scientist responded, "There is no legal responsibility. All we do is to send it up at one point - the earth does the rest by revolving under it. The other country would simply get under the satellite."³⁹

³⁵ Cited in Bulkeley, 83.

³⁶ Three sources provide an excellent overview of the American ICBM program's roots and development. See Ernest G. Schwiebert, *A History of U.S. Air Force Ballistic Missiles* (New York: Praeger, 1965) for an overview. Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Center for Air Force History, 1990) emphasizes the administrative, technical, and logistical aspects of the first generation of ICBMs. Edmund Beard, *Developing the ICBM: A Study in Bureaucratic Politics* (New York: Columbia University Press, 1976) details the bureaucratic, cultural, and political environment in which the ICBM matured.

³⁷ R. Cargill Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in *Exploring the Unknown, Volume I*, 215.

³⁸ Hall, "Early U.S. Satellite Proposals," 431.

³⁹ Conference on Methods for Studying the Psychological Effects of Unconventional Weapons, RAND Corp, January 26-28, 1949, SPI document 1297, pp. 89-90. Emphasis in original.

Perhaps the most important Rand report setting the Air Force on its way toward authorizing a reconnaissance satellite was published in October 1950. Its author concluded it was possible to build a satellite that could create "a pictorial record of a wide band of the earth's surface along its trajectory. . . ." Such a "television reconnaissance satellite" would be "highly valuable" because "a direct pictorial record of otherwise inaccessible regions could be obtained" with resolution of half a city block. This data "would be of high military value" and of a kind that "could not be obtained from any other source."⁴⁰ This report also made clear the propaganda aspects of such a vehicle, albeit with a presumption (as did all the previous reports) that the United States would be the first to do so: "The successful launch of a satellite instrument is bound to be a spectacular event, causing a worldwide sensation. . . . As proof of United States technological and economic strength, it will be impressive."⁴¹ Finally, this document emphasized the importance of somehow establishing a legal right of overflight for such satellites: "We may assume that satellite operations designed to gather visual information in Soviet territory . . . will be construed by them as a 'consummated act of aggression'. . . Perhaps the best way to minimize the risk of countermeasures would be to launch an 'experimental' satellite on an equatorial orbit." Nevertheless, reconnaissance satellite R&D should proceed because the United States knew little concerning the location and nature of vital Soviet installations: "Our knowledge of this at present is extremely deficient; this seriously affects the chances of success of strategic bombing. . . . Visual reconnaissance of the type promise by the satellite would, then, if successful, undoubtedly yield a considerable payoff . . . by enhancing the expected effectiveness of air strikes." Thus, the satellite would have a huge political payoff ". . . culminating in greater Soviet readiness to refrain from attack or even to yield to pressure."⁴²

These late 1950 sentiments presaged closely the two motive factors of what would be Eisenhower's space policy five years later: first, the desire to diminish the likelihood of a surprise attack on America by gathering photographic intelligence information on the Soviet Union; and second, the neces-

⁴⁰ Paul Kecskemeti, RAND Corporation, "The Satellite Rocket Vehicle: Political and Psychological Problems," RAND Report RM-567, October 5, 1950, SPI document 1284, pp. 1-5.

⁴¹ Ibid., 8.

⁴² Ibid., 14, 17, 20-22.

sary precursor of establishing a legal regime of 'freedom of space' in which reconnaissance satellites could operate. It also anticipated Eisenhower's use of a civilian satellite (the Vanguard as part of the International Geophysical Year) to establish the overflight precedent. Kennedy would endorse these principles but also add to them an emphasis on human spaceflight as a prestige-gathering instrument. As McDougall pointed out, "In these few pages the RAND Corporation spelled out the central political problem attending the birth of the Space Age."⁴³

In April 1951 Rand elaborated upon the October 1950 report by exploring detailed designs in two studies: *The Utility of a Satellite Vehicle for Reconnaissance*, and *Inquiry Into the Feasibility of Weather Reconnaissance from a Satellite Vehicle*. The former emphasized, "The reliable operation of a satellite vehicle poses difficult but by no means unsolvable technical problems" because "The various components constituting a satellite vehicle to be utilized for reconnaissance have been shown to be individually feasible" and could attain resolution of 100 feet every day and 40 feet under certain conditions.⁴⁴ The latter reached similar conclusions concerning the collection of weather data from a higher orbit of approximately 350 miles: "The development of all the suggested methods mentioned in this report appears to be feasible" and so "the analysis of synoptic weather from satellite observations is also feasible."⁴⁵

At this point the Air Force felt much freer to act on such recommendations than it had in the 1946-1950 period. The distinguishing factor was the June 1950 invasion of South Korea by the Communist North Korea and the subsequent tripling of defense expenditures. Funds for exploratory R&D were now available that previously were not. Therefore in late 1951 the Air Force authorized Rand to contact various defense firms over the course of 1952 and 1953 to solicit specific designs for actual reconnais-

⁴³ Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., Publishers, 1985), 109.

⁴⁴ R.M. Salter and J.E. Lipp, *Utility of a Satellite Vehicle for Reconnaissance*, RAND Report R-217, April 1951, SPI document 1296, pp. 69, 80. The version of this document reprinted in *Exploring the Unknown, Volume I*, 245-261 only contains material up to and including page 39.

⁴⁵ S.M. Greenfield and W.W. Kellogg, *Inquiry Into the Feasibility of Weather Reconnaissance from a Satellite Vehicle*, RAND Report R-218, April 1951, folder: Rand Reports, box 99, Curtis LeMay papers, Library of Congress, 31.

sance satellites. This collective effort was called Project Feed Back and produced a final report in March 1954.⁴⁶ In addition, 1953 saw the inauguration of Eisenhower and the quickening of interest in ICBMs. Therefore, "The expectation that development of the ICBM was a practical option gave a new impetus to studies on space missions and space vehicles."⁴⁷ As mentioned previously, the ICBM was practical at this time because of the successful testing of thermonuclear technology.

One should not assume, however, that the climate between 1950 and 1955 was overwhelmingly favorable concerning the development of satellite technology. National Academy of Sciences member Lloyd Berkner recalled, "When a group of scientists, after a summer of study in 1952, advocated that the United States seriously undertake a space program, the idea was hooted down as outrageous."⁴⁸ Within the Air Force, General Thomas White lamented in December 1952 that the Air Force's study and research effort into satellites amounted to only \$200,000 in FY52 and was budgeted for only \$400,000 in FY53 and \$300,000 in FY54, figures he called "too little too late."⁴⁹

Apparently, there was enough Air Force and Rand activity to catch the attention of even President Truman. He tasked a physicist from Temple University, A.V. Grosse, to examine the question of satellites. Grosse's report was not finished during Truman's term but was presented to Eisenhower in August 1953. It is another document illustrating the close link between civilian and military concerns in the early space age. He discussed a satellite's scientific research value, its military utility as "a valuable observation post," and its psychological/propaganda value as "a highly effective sky messenger of the free world" that would create a "psychological effect" that must be "considered of utmost value by members of

⁴⁶ Philip J. Klass, *Secret Sentries in Space* (New York: Random House, 1971), 76 claims that Project Feed Back was "indirectly sponsored by the CIA." The author of this dissertation was unable to discover any primary source evidence or documentation supporting this assertion.

⁴⁷ Merton E. Davies and William R. Harris, *RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology* (Santa Monica, CA: The RAND Corporation, 1988), 47.

⁴⁸ Van Dyke, 12.

⁴⁹ General Thomas White to the Deputy Chief of Staff of the Air Force for Development, December 18, 1952, document 598, p. 6 in the microfiche collection *Military Uses of Space, 1945-1991*, Jeffrey Richelson, Consultant and Project Director (Alexandria, VA: The National Security Archive and Chadwyck-Healey, Inc., 1991). The total collection is 708 documents on 239 microfiche sheets. NSA MUS.

the Soviet Politbureau." Further, Grosse concluded that "... the satellite would have the enormous advantage of influencing the minds of millions of people the world over during the so-called period of 'cold war' or during the peace years preceding a possible World War III." Finally, "If the Soviet Union should accomplish this ahead of us it would be a serious blow to the technical and engineering prestige of America the world over. It would be used by Soviet propaganda for all it is worth."⁵⁰ Therefore, early in the Eisenhower administration, there was the first discussion of the propaganda or prestige value of space that was made known to the top decision-making levels of the executive branch.

A few months later, in March 1954, Rand delivered Project Feed Back's final report to the Air Force. Brigadier General Schriever said it identified all the support missions such as navigation, communications, meteorological reconnaissance as well as photographic reconnaissance that satellites could perform.⁵¹ It recommended the Air Force "undertake the earliest possible completion and use of an efficient satellite reconnaissance vehicle" as a matter of "vital strategic interest to the United States." The Feed Back report stated that developing such a satellite would require approximately seven years and \$165 million. The resulting capability would be a resolution of approximately 144 feet from 300 miles while scanning a strip of land 375 miles wide.⁵² The Air Force did not respond immediately but on November 27, 1954 its Air Research and Development Command issued System Requirement No. 5 for the development of a reconnaissance satellite system and this was followed on March 16, 1955 by Headquarters USAF issuing General Operational Requirement No. 80 officially ordering the development of an advanced reconnaissance satellite to provide continuous surveillance of "preselected areas of the earth" in order "to determine the status of a potential enemy's warmaking capability."⁵³ The Air Force was offi-

⁵⁰ A.V. Grosse, "Report on the Present State of the Satellite Problem," The Research Institute of Temple University, August 25, 1953, *Exploring the Unknown, Volume I*, 267-69. Emphasis in original. The introduction to the reprinted Grosse report in *Volume I*, 266-67, explains that one copy of the report was delivered to Dr. John R. Dunning, dean of the School of Engineering, Columbia University. Dunning in turn discussed the report with President Eisenhower "and the report contributed to the initiation of Project Vanguard."

⁵¹ Oral history interview with the author, July 2, 1996.

⁵² Cited in Davies and Harris, 53f. Official title of the Feed Back final report was *An Analysis of the Potential of an Unconventional Reconnaissance Method*.

⁵³ General Operational Requirement No. 80 cited from *ibid.*, 61.

cially in the space business and the reason was reconnaissance. The Air Force opened a design competition code named Pied Piper between the RCA Corporation, Glenn L. Martin Company, and Lockheed Aircraft. On October 29, 1956 Lockheed received the development contract. From this point, the program was generally referred to as WS-117L and "the military satellite program was now committed to development and testing of actual satellites."⁵⁴

Nevertheless, spending was limited in July 1956 to \$3 million for FY57,⁵⁵ described as "a major disappointment to all involved, since it was less than ten percent as much as was needed to go to full-scale development."⁵⁶ Indeed, the remainder of the pre-Sputnik progress of the military space program (which was comprised essentially of WS-117L) can best be described as lean. One Air Force history elaborates that WS-117L

ran into two difficulties. First, the economic policy cutting research and development funds had crippled the project badly. The most valiant efforts of AFBMD [Air Force Ballistic Missile Division], ARDC [Air Research and Development Command] and Headquarters USAF came to nothing. Worse, top officials within the offices of the Secretary of Defense The Secretary of the Air Force showed academic interest but warned that insistence [on more funding] would create unfavorable repercussions at high political levels.⁵⁷

Secretary of Defense Charles Wilson's attitude is best seen by his remark on December 17, 1954 when asked to react to the suggestion that the Soviets might orbit a satellite before the United States: "I wouldn't care if they did."⁵⁸ Schriever recalls making a speech in San Diego in February 1957 describing AF R&D into space-related topics and how 90 percent of the unmanned satellite missions in space could be undertaken with the propulsion, guidance, and structural techniques being developed in the USAF bal-

⁵⁴ Bruno W. Augenstein, Appendix 1, "Evolution of the U.S. Military Space Program, 1945-1960: Some Events in Study, Planning, and Program Development," in Yuri Ra'anani and Robert L. Pfaltzgraff, Jr., editors, *International Security Dimensions of Space* (Hamden, CT: Archon Books, 1984), 275.

⁵⁵ Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 13.

⁵⁶ Dwayne Day, "CORONA: America's First Spy Satellite Program," *Quest: The History of Spaceflight Magazine* 4 (Summer 1995): 9.

⁵⁷ Bowen, 48.

⁵⁸ *Ibid.*, 69.

listic missile program. "... I was ordered the next day by Wilson himself not to use the word space in any of my speeches in the future."⁵⁹

Schriever also relates how that same month he was "pounding the halls" of the Pentagon in an attempt to secure \$10 million for the WS-117L program. He finally got it but "... with the instructions that we could not use that money in any other way except for component development. No systems work whatsoever. Ten million dollars!"⁶⁰ Schriever concluded. "As a result, our situation was not conducive to moving rapidly into space in early 1957, although there was serious intent on the part of the Air Force to exploit space for national security purposes. When Sputnik came along in October, the floodgates opened."⁶¹ Actual pre-Sputnik funding for WS-117L was \$4.7 million in FY56, \$13.9 million in FY57 and \$15.5 million in FY57 (which was greatly increased to \$65.8 million a result of Sputnik).⁶² A factor the military officers were clearly unaware of will become apparent in this chapter's next section: Eisenhower's policy did not want a military satellite to precede a civilian satellite into orbit; in fact, just the opposite was true. The civilian/scientific program needed to be first to establish the legal right of over-flight for anticipated reconnaissance satellites.

Eisenhower and Defense

As of early 1955, there was not yet any civilian/scientific satellite program. Before discussing the complicated evolution of that component of the American space program, it is necessary to consider the more fundamental issue of Eisenhower's beliefs concerning the role of government and the Soviet threat. These philosophical tenets were among the primary determinants of exactly how Eisenhower would structure that civilian/scientific space program.

⁵⁹ Oral history interview of, June 29, 1977, K239.0512-1492, AFHRA, 7; and Ernest G. Schwiebert, "USAF Ballistic Missiles: 1954-1964," *Air Force Space Digest* (May 1964): 160-161.

⁶⁰ Cited in Jacob Neufeld, editor, *Research and Development In the United States Air Force* (Washington, DC: Center for Air Force History, 1993), 88; Schwiebert, *ibid.*, 160; and Klass, 77-78.

⁶¹ General Bernard A. Schriever, "Comments," in Allan A. Needell, editor, *The First 25 Years in Space* (Washington, DC: Smithsonian Institution Press, 1983), 28.

⁶² Davies and Harris, 95; and Divine, *Sputnik Challenge*, 11.

Eisenhower fully subscribed to the containment doctrine the Truman administration had developed with its fundamental presupposition of a Soviet Union striving for world hegemony. George Kennan wrote that the "... main element of any United States policy toward the Soviet Union must be that of a long-term patient but firm and vigilant containment of Russian expansive tendencies ... by the adroit and vigilant application of counter-force at a series of constantly shifting geographical and political points, corresponding to the shifts and maneuvers of Soviet policy. . . ."⁶³ Truman's basic national security document, NSC 7, clearly stated, "The ultimate objective of Soviet-directed world communism is the domination of the world. . . . The United States is the only source of power capable of mobilizing successful opposition to the communist goal of world conquest. . . . The defeat of Soviet-directed world communism is vital to the security of the United States."⁶⁴

Containment took on a more overtly military tone with NSC-68, written before, but approved after, the invasion of South Korea by the Communist North in June 1950. This document declared the Soviet Union

is animated by a new fanatic faith, antithetical to our own, and seeks to impose its absolute authority over the rest of the world. Conflict has . . . become endemic and is waged, on the part of the Soviet Union, by violent or non-violent methods in accordance with the dictates of expediency. . . . [Soviet policy] calls for the complete subversion or forcible destruction of the machinery of government and structure of society in the countries of the non-Soviet world and their replacement by an apparatus and structure subservient to and controlled from the Kremlin. . . . the cold war is in fact a real war in which the survival of the free world is at stake.⁶⁵

NSC 68 recommended the United States at least double the percentage of its gross national product (GNP) devoted to defense from 6-7 percent to 13-14 percent.⁶⁶ This would entail an increase in defense spending

⁶³ George Kennan, "The Sources of Soviet Conduct," *Foreign Affairs* 25 (July 1947): 575-76.

⁶⁴ NSC 7, The Position of the World With Respect to Soviet-Directed World Communism, March 30, 1948, document 15, pp. 1, 5, in the collection *Presidential Directives on National Security from Truman to Clinton*, Jeffrey Richelson, Consultant and Project Director (Alexandria, VA: The National Security Archive and Chadwyck-Healey, Inc., 1994.) Approximately 1200 documents from this large collection fall within this dissertation's time frame. NSA PD.

⁶⁵ NSC 68, United States objectives and Programs for National Security, April 14, 1950, NSA PD document 176 pp. 4-6, 64.

⁶⁶ *Ibid.*, 25.

from the ceiling of \$13 billion imposed by Truman for the FY51 budget to approximately \$35 billion. This seemed unlikely to occur until the invasion of South Korea. By FY53 defense spending had in fact increased to \$50.4 billion and 13.5 percent of GNP.⁶⁷

This was the basic situation when Eisenhower became president. His campaign had included no shortage of cold war rhetoric, including talk of 'liberating' the Eastern European countries under Soviet domination. Any number of speeches from his early presidency have passages such as the one from April 16, 1953, in which he chastised the Soviet Union for finding security "... not in mutual trust but in *force*: huge armies, subversion, rule of neighbor nations. . . . The result has been tragic for the world."⁶⁸ And yet, in this same speech Eisenhower delivered his famous call for "all peoples again to resume their common quest of a just peace" because every gun made, every warship launched, every rocket fired "... signifies in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed." He explained the cost of a modern bomber is 30 schools, or two electric power plants, or two fine hospitals, or fifty miles of highway.⁶⁹ Of course there is a rhetorical element in these words but they nonetheless illustrate a truism applicable to both Eisenhower and Kennedy: both men were wholeheartedly committed to the containment doctrine and resisting Communist aggression while at the same time remaining open to verifiable arms control measures, acts of East-West good will, and discussion of cooperative ventures. Prosecuting the cold war and lessening tension in the cold war were not mutually exclusive in each man's mind. This goes a long way toward making some of their Janus-like words and deeds assume a more rational perspective.

Thus Eisenhower could declare in the first of a series of Basic National Security documents from the NSC that "... there is no basis for concluding that the fundamental hostility of the Kremlin toward the West has abated, that the ultimate objective of the Soviet rulers have changed, or that the menace of

⁶⁷ Samuel Huntington, *The Common Defense: Strategic Programs in National Politics* (New York: Columbia University Press, 1961), 53-54.

⁶⁸ Eisenhower, The Chance for Peace, April 16, 1953, *Public Papers of the Presidents of the United States, 1953* (Washington, DC: USGPO, 1960), 180. Emphasis in original.

⁶⁹ *Ibid.*, 181-82.

communism to the free world has diminished" in June of 1953⁷⁰ and in December that same year stated, "We will never say that the peoples of Russia are an enemy with whom we have no desire ever to deal or mingle in friendly and fruitful relationship" and that the United States is "instantly prepared to meet privately with such other countries as may be 'principally involved' to seek 'an acceptable solution' to the atomic armaments race which overshadows not only the peace, but the very life, of the world."⁷¹ Such seemingly contradictory couplets could be cited *ad nauseam* for both Eisenhower and Kennedy but would simply make the same point: that fighting the cold war in accordance with the containment doctrine was not mutually exclusive with the simultaneous quest for a lessening of tensions. The applicability to the space policy arena is that, first, in a similar manner both men could propose cooperative ventures in space while continuing an independent American human spaceflight program, which in Kennedy's mind was a valuable competitive tool.

Second, Eisenhower viewed the cold war as indefinite in duration; this meant a careful husbanding of national resources so as to maintain the vigor of the American economy; this meant no one area, not national defense and certainly not the space program, would receive unlimited resources. The delicate balancing act of devoting adequate resources to the Pentagon so as to ensure national security but without going overboard, causing inflation, and sabotaging the American economy, is called the Great Equation. (See pages 5-6 of this dissertation for Eisenhower's definition.) Succinctly put, "We must not destroy what we are attempting to defend." John Lewis Gaddis characterizes this as "... the most consistent element in his [Eisenhower's] thinking on national security policy; the processes of defense, he repeatedly argued, should never be allowed to overshadow the purposes of defense."⁷²

⁷⁰ NSC 153/1, Basic National Security Policy, June 10, 1953, cited in Raymond L. Garthoff, *Assessing: Estimates by the Eisenhower Administration of Soviet Intentions and Capabilities* (Washington, DC: The Brookings Institution, 1991), 4.

⁷¹ Eisenhower, Address Before the General Assembly of the United Nations on Peaceful Uses of Atomic Energy, *Public Papers 1953*, 818-820. This was his famous "Atoms for Peace" speech.

⁷² John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy* (Oxford and New York: Oxford University Press, 1982), 273.

The essence of Eisenhower's defense policy, known as the New Look, was to increase reliance on nuclear weapons to enforce the containment doctrine because they were demonstrably cheaper than maintaining a large conventional force. NSC 162/2 explained the New Look as designed "to meet the Soviet threat to U.S. security [but] in doing so, to avoid seriously weakening the U.S. economy or undermining our fundamental values and institutions." Since "the USSR will continue to rely heavily on tactics of division and subversion to weaken the free world alliances and will to resist the Soviet power," defense against the Soviet threat required the development and maintenance of "a strong military posture, with emphasis on the capability of inflicting massive retaliatory damage by offensive striking power" which was only possible if the United States maintained "a sound, strong and growing economy, capable of providing through the operation of free institutions, the strength described. . . ." Given the fact that "only the United States can provide and maintain, for a period of years to come, the atomic capability to counterbalance Soviet atomic power. . . sufficient atomic weapons and effective means of delivery are indispensable for U.S. security. . . . In the event of hostilities, the United States will consider nuclear weapons to be as available for use as other munitions."

NSC 162/2 emphasized not only massive retaliation but also the fact that ". . . the security of the whole free world is dependent on the avoidance of recession and on the long-term expansion of the U.S. economy." Therefore, "expenditures for national security, in fact all federal, state and local governmental expenditures, must be carefully scrutinized with a view to measuring their impact on the national economy" because "excessive government spending leads to inflationary deficits or to repressive taxation, or to both." In essence, "A sound, strong, and growing U.S. economy is necessary to support over the long pull a satisfactory posture of defense in the free world. . . ."⁷³ These sentiments were echoed in policy documents over the rest of the pre-Sputnik period.⁷⁴

⁷³ NSC 162/2, Basic National Security Policy, October 30, 1953, NSA PD document 353, pp. 1-22.

⁷⁴ See in particular NSC 5422/2, Political and Military Elements of National Security Policy, August 7, 1954, NSA PD document 412; NSC 5602/1, Basic National Security Policy, March 15, 1956, NSA PD document 470; and NSC 5708/8, Basic National Security Policy, June 3, 1957, NSA PD document 510.

Eisenhower explained the concrete consequences of the New Look to America's defense structure. Between December 1953 and June 1955 the Army's size was decreased from 1.5 million men to 1.0; the Navy and Marine Corps from 1 million to 870,000; the Air Force, however, was increased from 950,000 to 970,000 in accordance with the increased reliance on deterrence through nuclear weapons, not conventional forces. Eisenhower's budgetary figures for FY54 and FY55 tell the same story: the Army decreased from \$12.9 billion to \$8.8; the Navy/Marine Corps from \$11.2 billion to \$9.7; the Air Force increased from \$15.6 billion to \$16.4. He stated clearly, "My intention was firm: to launch the Strategic Air Command immediately upon trustworthy evidence of a general attack against the West. . . . The communists would have to be made to realize that should they be guilty of major aggression, we would strike with means of our own choosing at the head of the Communist power."⁷⁵ Throughout Eisenhower's terms the Air Force received around 46 percent of the DoD budget, the Navy/Marine Corps 27 percent and the Army 23 percent.⁷⁶ Overall defense spending was cut from \$50.3 billion when Eisenhower assumed office to \$40.6 billion in FY55.⁷⁷ Over Eisenhower's eight years in office military spending declined as a share of the federal budget from 65.7 percent to 48.5 percent and as a percentage of GNP from 12.8 percent to 9.1 percent. ". . . with no net reduction in American military strength relative to that of the Soviet Union."⁷⁸

⁷⁵ Dwight D. Eisenhower, *Waging Peace: 1956-1960* (New York: Doubleday & Company, Inc., 1965), 452-454. From 1953 to 1957 the Army dropped from 20 divisions to 14, the Navy from 1126 combat ships to 1030, but the Air Force expanded from 110 wings to 137: see Huntington, 76.

⁷⁶ Douglas Kinnard, "President Eisenhower and the Defense Budget," *Journal of Politics* 39 (August 1977): 605. The Air Force operated the heavy bombers, in particular the new B-52s, that were the backbone of the nuclear deterrent force when Eisenhower came to office. The Air Force also would be the home for the ICBMs that would be integrated into the deterrent structure in the Eisenhower administration. The United States Navy would manage the fleet ballistic missile submarines that were developed and fielded, also during the Eisenhower administration. Therefore, the Air Force controlled two-thirds of the strategic triad and was able to increase its budget, both in absolute dollars and as a percentage of the defense budget, during the Eisenhower administration while the Navy and especially the Army suffered consistent budgetary reductions.

⁷⁷ Iwan [not Ivan] Morgan, "Eisenhower and the Balanced Budget," in Shirley Anne Warshaw, editor, *Reexamining the Eisenhower Presidency* (Westport, CT: Greenwood Press, 1993), 126.

⁷⁸ Gaddis, 164.

This overview of the New Look is necessary to understand how, in a declining defense budget, funding for ICBMs could increase dramatically, thereby laying the foundation for the post-Sputnik space program. It also goes a long way toward explaining the bitter interservice rivalry that developed and helped convince Eisenhower to create a separate civilian organization (NASA) for space exploration after Sputnik. This study is not the place for a complete history of early ICBM development.⁷⁹ McDougall makes the salient point when he explains that the early histories of the satellite program and the ICBM program are parallel because there was "... a brief flurry of enthusiasm after the war [WWII], followed by budget cuts and cancellations, followed after some years by sudden revival in reaction to Soviet progress."⁸⁰

When he became president, Eisenhower reportedly "... looked around and said, 'Where are the rockets?'"⁸¹ Eisenhower explained, "So, when I came in here, I got successive scientific committees to get into this thing [ICBMs] and find out what was going on, what we should be doing, and it took them quite a long time." But after the scientists recommended the highest priority for ballistic missiles, "... the whole project was now put on first priority, over every other expenditure."⁸² The ICBM fit very well into Eisenhower's New Look defense concept: it provided relatively cheap (when compared to masses of manned bombers) nuclear deterrence from American soil. The fact that, according to Schriever, "... 90 percent of the developments in the ballistic-missile program can be applied to advancing in space, satellites, and other vehicles" because it is a "... normal transition to step from these ballistic missiles into satellites, moon rockets, going to planets" turned out to be an added bonus.⁸³

⁷⁹ Consult references in note 36 above, in particular Neufeld chapters I-IV, for this information.

⁸⁰ McDougall, 99.

⁸¹ Oral history of Bryce Harlow, Deputy Assistant to the President for Congressional Affairs, June 11, 1974, folder: Bryce Harlow interview, box: White House, Presidents, Eisenhower (cont.), DOD/CIA Information, Eisenhower, John S.D. - Lodge H.C., NHDRC, 6.

⁸² Presidential News Conference, October 1, 1958, *Public Papers of the Presidents, 1958* (Washington, DC: USGPO, 1959), 721.

⁸³ Cited in Futrell, *Volume I*, 545.

America's first ICBM, the Atlas, saw its funding explode from \$3 million in FY53 (the first year the DoD was permitted to spend over \$1 million) to \$161 million in FY55. By 1957 the overall ballistic missile program, to include the Air Force's Atlas, Titan, Thor, and Minuteman, the Army's Jupiter, and the Navy's Polaris, was \$1.3 billion,⁸⁴ a 433-fold increase under Eisenhower. NSC Action No. 1433, September 13, 1955 declared, "There would be the gravest repercussions on the national security and on the cohesion of the Free World, should the USSR achieve an operational capability with the ICBM substantially in advance of the United States. In view of the known Soviet progress in this field . . . the Secretary of Defense will prosecute the program with maximum urgency, and all other Executive departments and agencies will assist the Department of Defense as required."⁸⁵ The ICBM was given the highest priority of all DoD programs.

It was almost inevitable that such a priority would generate intense interservice rivalry. During the Eisenhower administration all three services were concurrently developing the six separate systems mentioned above. One DoD official explained such duplication: "We charge it off to insurance - expensive but necessary. . . . But the intense race between the Army and Air Force goes on - and each regards it essentially as a matter of survival."⁸⁶ In March 1956 the Chairman of the Joint Chiefs of Staff warned ". . . that unless brought under control a situation may develop in which the Services are involved in increasing public disagreement among themselves" over missiles. Eisenhower lamented what he termed "competitive publicity" among the services because it was ". . . highly harmful to the Nation, and thought it should be stopped."⁸⁷ A week later Eisenhower continued by emphasizing that the generals had to ". . . think of what the other services contribute. If he can't bring himself to do this, he doesn't belong in the

⁸⁴ Eisenhower, *Waging Peace*, 208.

⁸⁵ Cited in NSC 6108, Certain Aspects of Missile and Space Programs, January 18, 1961, SPI document 278, p. 1.

⁸⁶ Oliver M. Gale, Special Assistant to the Secretary of Defense, 1957-1961, "Post-Sputnik Washington from an Inside Office," *Cincinnati Historical Society Bulletin* 31 (1973): 228.

⁸⁷ Andrew Goodpaster, Memorandum of Conference with the President (memcon), March 30, 1956, folder: Staff Memos: March 1956, box: 15, DDE Diary Series, Ann Whitman File, DDEL, 2.

position he holds." If any information was being leaked to the press, the individuals responsible "should be found and severely disciplined."⁸⁸

Secretary of Defense Wilson attempted to put a lid on the missile interservice rivalry situation by declaring in November 1956: that operation of the intermediate range systems on land (Thor and Jupiter) would be the sole responsibility of the Air Force, and on sea (Polaris) the Navy would be responsible; that the Army would not plan for the operational employment of any missiles with ranges beyond 200 miles; that the long range ICBMs continued, as before, to be the sole responsibility of the Air Force.⁸⁹ But the missile bickering continued and after Sputnik's launch it quickly metastasized into the space roles and missions field, helping nudge Eisenhower in the direction of authorizing the creation of a civilian space agency and assigning it the human spaceflight mission. The intense work on the ICBM before Sputnik is also important to the NASA-DoD story because "... the military capability could be tapped for the projection of a human and robotic presence into space"⁹⁰ and all the resulting technology "... created an environment much more conducive to the establishment of an aggressive space program. . . . without it NASA and the aggressive piloted programs of the 1960s could never have been approved."⁹¹

Setting the Stage for Sputnik

This chapter's necessary background information is now complete⁹² and the discussion can turn to the three crucial events of the pre-Sputnik era: the report of the Technological Capabilities Panel (TCP), America's first space policy NSC 5520, and the establishment of a civilian scientific satellite pro-

⁸⁸ Goodpaster, memcon, April 5, 1956, folder: Staff Memos: April 1956, Ann Whitman File, DDE Diary Series, DDEL, 3-4.

⁸⁹ Wilson memorandum reprinted in Congress, Senate, Committee on Aeronautical and Space Sciences, Subcommittee on NASA Authorizations, *Transfer of the Von Braun Team to NASA*, H.J. Res. 567, 86th Congress, 2nd Session, February 18, 1960, 307-11.

⁹⁰ Roger D. Launius, *A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 16.

⁹¹ Launius, "Early U.S. Civil Space Policy," 76-77.

⁹² Except for a discussion of the relevant aspects of the history of NASA's predecessor organization, the National Advisory Committee on Aeronautics (NACA). This will be presented at the end of the chapter because it does not fit neatly into the narrative flow at any particular point.

gram (Vanguard) as a concrete expression of the dual civilian-military space policy created by these two documents. The stage will then be set for the appearance of Sputnik.

Technological Capabilities Panel

The creation of the TCP rests in Eisenhower's desire to avoid another Pearl Harbor. After this traumatic event, many American political and military leaders would understandably put a priority on not only being able to respond to a surprise attack, but also on somehow obtaining the information necessary to detect preparations for such an attack and thereby possibly prevent it through diplomatic or other means. The need for better intelligence on the USSR's strategic capabilities and intentions was highlighted by "a rapid succession of several ominous developments in the late 1940s and early 1950s" such as the failure to predict when the Soviets would first develop atomic weapons, uncertainty over the pace and nature of the program once its existence was known, failure to anticipate Soviet progress on its hydrogen bomb, the surprise attack by North Korea and uncertainties surrounding a possible "bomber gap."⁹³ A scientist close to Eisenhower remarked, "Our knowledge of what was going on inside the U.S.S.R. was desperately weak" and attempts to gather information via spies parachuted into the USSR or dropped off by submarines were "a total failure." Aerial reconnaissance conducted from aircraft patrolling the periphery of the USSR produced some information but "was a particularly hazardous business."⁹⁴

Eisenhower's biographer concluded that for Eisenhower's generation, "Pearl Harbor burned into their souls in a way that younger men, the leaders in the later decades of the Cold War, had not."⁹⁵ Consequently, Eisenhower "... had an abiding dread of the possibility"⁹⁶ and detecting and preventing another surprise attack on the United States "... completely dominated his thinking about disarmament and rela-

⁹³ Peter L. Hayes, *Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War*, Ph.D. dissertation (Fletcher School of Law and Diplomacy, Tufts University, 1994), 53.

⁹⁴ George Kistiakowsky, cited by William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Berkley Books, 1986), 53-54.

⁹⁵ Stephen Ambrose, *Eisenhower: Volume II, The President* (New York: Simon and Schuster, 1984), 257, as contained in Hall, "Origins of U.S. Space Policy," 216.

⁹⁶ Robert H. Johnson, *Improbable Dangers: US Conceptions of Threat in the Cold War and After* (New York: St. Martin's Press, 1994), 100.

tions with the Soviets for the next eight years."⁹⁷ For answers, he turned to a group of academic and industrial scientists who would provide Eisenhower invaluable evidence concerning space policy for the remainder of his administration.

James R. Killian, Jr., was the President of the Massachusetts Institute of Technology. He was also a member of Eisenhower's Science Advisory Committee (SAC). He records how in a March 27, 1954 SAC meeting Eisenhower discussed "... the danger of a surprise attack on the United States and stressed the high priority he gave to reducing the probability of military surprise. . . . This fear. . . haunted Eisenhower throughout his presidency."⁹⁸ In the meeting Eisenhower tasked his SAC to undertake a "searching review of the whole status of our weapons development programs"⁹⁹ with a special emphasis on "... the present vulnerability of the U-S- to surprise attack and ways whereby science and technology can strengthen our offense and defense to reduce this hazard."¹⁰⁰ The responsible group became known as the Technological Capabilities Panel (TCP).

Although relatively unknown, the TCP's February 1955 final report is one of the seminal documents of the cold war and certainly of American space policy. It (or its classified annexes) contained the recommendations that led to the intermediate range ballistic missiles (IRBM) mentioned above (Thor, Jupiter, Polaris), to the supersecret U-2 reconnaissance aircraft, and supported reconnaissance satellite development. Its reasoned analysis of the threat of surprise attack divided the immediate future into four phases and recommended specific actions for each to minimize the risk; it correctly foretold how by phase four, possibly within a decade, both the United States and USSR would be able to destroy each other and neither could achieve an advantage in a nuclear exchange assuming one side did not develop ballistic

⁹⁷ Hall, "Origins of U.S. Space Policy," 216.

⁹⁸ James R. Killian, Jr., *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge, MA: The MIT Press, 1977), 68.

⁹⁹ Oral history interview of James Killian, November 9, 1969 through July 16, 1970, DDEL, 14.

¹⁰⁰ Technological Capabilities Panel (TCP) final report. "Meeting the Threat of Surprise Attack: The Report to the President by the Technological Capabilities Panel of the Science Advisory Committee." volume one, February 14, 1955, SPI document 1410, p. v.

missiles before the other. However, the United States would be in grave peril if the Soviets developed these weapons first. In addition to the IRBM and U-2 recommendations, the TCP suggested dispersal of the American bomber force, extension of the Distant Early Warning line, and numerous research and development projects.¹⁰¹ Its general section on intelligence gathering concluded

We must find ways to increase the number of hard facts upon which our intelligence estimates are based, to provide better strategic warning, to minimize surprise in the kind of attack, and to reduce the danger of gross overestimation or gross underestimation of the threat. To this end, we recommend adoption of a vigorous program for the extensive use, in many procedures, of the most advanced knowledge in science and technology.¹⁰²

Also of general importance from the TCP is the fact that there was not one leak associated with it; this greatly pleased Eisenhower, who grew to increasingly trust the scientists associated with the TCP effort, especially Killian, and set the stage for Eisenhower to task Killian after Sputnik with creating an organizational structure for the space program under civilian control.¹⁰³ Quite simply, "The TCP report of 1955 set the pace and direction of American strategic policy for years to come,"¹⁰⁴ including space policy.

Recently declassified documents illuminate the central role the TCP report played in codifying the civil-military bifurcation in American space policy. The space-related recommendations of the TCP were 9b for general policy and C-8 for particular actions. The former stated, "Freedom of Space. The present possibility of launching a small artificial satellite into an orbit about the earth presents an early opportunity to establish a precedent for distinguishing between 'national air' and 'international space,' a

¹⁰¹ Ibid., 1-38.

¹⁰² Unfortunately, the entire Part V, "Intelligence," of the TCP report dealing with intelligence gathering remains classified, pp. 133-152; this includes the entire space and satellite related sections. This excerpt comes from Killian's memoirs, *Sputnik, Scientists, and Eisenhower*, 79. Other excerpts can be found cited in documents created by associated governmental agencies such as the NSC.

¹⁰³ See Killian, 67, 86.

¹⁰⁴ Alex Roland, *Model Research: The National Advisory Committee for Aeronautics, 1915-1958, Volume I*, NASA SP-4103 (Washington, DC: USGPO, 1985), 280. Roland discusses the TCP in the context of NACA's history to explain the context in which NACA's budget stabilized in the mid-1950s after falling for several years. Roland sees the TCP as an indication of Eisenhower's increasing concern with American scientific and technological progress and one result from this was the stabilizing of NACA's budget.

distinction which could be to our advantage at some future date when we might employ larger satellites for intelligence purposes." The latter elaborated

Intelligence applications warrant an immediate program leading to very small artificial satellites in orbits around the earth. Construction of large surveillance satellites must wait upon adequate solutions to some extraordinary technical problems in the information gathering and reporting system and its power supply, and should wait upon development of the intercontinental ballistic missile rocket propulsion system. The ultimate objective of research and development on the large satellite should be continuous surveillance that is both extensive and selective and that can give fine-scale detail sufficient for the identification of objects (airplanes, trains, buildings) on the ground.¹⁰⁵

Therefore, the TCP endorsed not only the idea that the primary utility of satellites was for reconnaissance/intelligence-gathering purposes, it also said a small civilian or scientific satellite should pave the way or serve as a sort of "stalking horse" to establish the legal right of overflight for the military reconnaissance satellites to come later.

NSC 5520

By May 27, 1955, these recommendations were made official American policy when Eisenhower endorsed NSC 5520, "U.S. Scientific Satellite Program." The key figure was Donald A. Quarles. He had been Assistant Secretary of Defense for Research and Development since September 1953; in August of 1955 he would become Secretary of the Air Force and in April 1957 Deputy Secretary of Defense until his death in 1959. He carefully examined the TCP report, was privy to information concerning the even more closely held U-2, and decided an official American policy concerning the use of space for reconnaissance and establishing the legal right of overflight was required. He drafted what would become NSC 5520 and submitted it to the NSC.¹⁰⁶ President Eisenhower approved it May 27, 1955.

NSC 5520, only recently declassified in its entirety, made official the priority of satellite reconnaissance, the "stalking horse" function of the civilian scientific satellite, and touched upon the prestige

¹⁰⁵ Cited in National Security Council, "Comments on the Report to the President by the Technological Capability Panel of the Science Advisory Committee," June 8, 1955. Folder: NSC 5522 - Technological Capabilities Panel (2), box 16, Policy Papers subseries, NSC series, OSANSA, Records: 1952-1961, White House Office, DDEL, S5, S23.

¹⁰⁶ For Quarles key role in initiating 5520, see George M. Watson, Jr., *The Office of the Secretary of the Air Force, 1947-1965* (Washington, DC: Center for Air Force History, 1993), 162, and R. Cargill Hall, "From Concept to National Policy: Strategic Reconnaissance in the Cold War," *Prologue: Quarterly Journal of the National Archives and Record Administration* 28 (Summer 1996): 119.

factor associated with space in the cold war. It must be cited extensively because the principles enshrined in it are applicable to the entire period covered by this study (bearing in mind Kennedy's modification to space policy):

While a small scientific satellite cannot carry surveillance equipment and therefore will have no direct intelligence potential, it does represent a technological step toward the achievement of the large surveillance satellite, and will be helpful to this end *so long as the small scientific satellite program does not impede development of the large surveillance satellite.*

Considerable prestige and psychological benefits will accrue to the national which first is successful in launching a satellite. The inference of such a demonstration of advanced technology and its unmistakable relationship to intercontinental ballistic missile technology might have important repercussions on the political determination of free world countries to resist Communist threats, *especially if the USSR were to be the first to establish a satellite.*

Furthermore, *a small scientific satellite will provide a test of the principle of 'Freedom of Space.'* . . . Preliminary studies indicate that there is no obstacle under international law to the launching of such a satellite. . . . The IGY affords an excellent opportunity to mesh a scientific satellite program with the cooperative worldwide geophysical observational program. The U.S. can simultaneously exploit its probable technical capability for launching a small scientific satellite. . . . *to gain scientific prestige, and to benefit research and development in the fields of military weapons systems and intelligence.* The U.S. should emphasize the peaceful purposes of the launching of such a satellite, although care must be taken as the project advances not to prejudice freedom of action (1) to proceed outside the IGY should difficulties arise in the IGY procedure, or (2) *to continue with its military satellite programs directed toward the launching of a large surveillance-type satellite when feasible and desirable.*

[DoD will] develop the capability of launching a small scientific satellite by 1958, *with the understanding that this program will not prejudice continued research directed toward large instrumented satellites for additional research and intelligence purposes, or materially delay other major Defense programs. . . [and] does not involve actions which imply a requirement for prior consent by any nation over which the satellite might pass in orbit, and thereby does not jeopardize the concept of 'Freedom of Space.'*

An attachment by Special Assistant to the President Nelson Rockefeller, specializing in cold war psychological operations, also became part of the policy and noted the international implications of being first to launch a satellite. He warned against

the costly consequences of allowing the Russian initiative to outrun ours through an achievement that will symbolize scientific and technical advancement to peoples everywhere. *The stake of prestige that is involved makes this a race that we cannot afford to lose.* [Since it is] certain that a vigorous propaganda will be employed to exploit all possible derogatory implications of any American success that may be achieved, it is highly important that the U.S. effort be initiated under auspices that are least vulnerable

to effective criticism.¹⁰⁷

The outlines of the nascent American space program were clear: a civilian scientific satellite program would be initiated under the IGY to gather scientific information about outer space and to establish a legalized regime for satellite overflight. However, this civilian effort would not be allowed to in any way impede the military's reconnaissance satellite effort nor other high priority DoD programs, i.e. the ballistic missiles. Eisenhower recalled, "... we were careful to keep the earth satellite program separated from the Defense Department's work on long-range ballistic missiles. . . . it was not to interfere with our top priority work on missiles."¹⁰⁸ It should be noted that when Eisenhower approved NSC 5520 on May 27, 1955 he referred it to the Secretary of Defense for implementation "in consultation with the Secretary of State and the Director of Central Intelligence."¹⁰⁹ Given the primacy of reconnaissance and intelligence concerns in the newly-issued space policy, CIA involvement from day one is not surprising.

At the same May 26, 1955 NSC meeting, "Mr. Allen Dulles [Director of Central Intelligence] observed that it was very important to make this attempt," referring to the IGY satellite.¹¹⁰ The next month the CIA reported, "A proposal to undertake a small satellite program in connection with the International Geophysical Year and for propaganda and scientific purposes has been presented to the NSC Planning Board by Department of Defense, Central Intelligence Agency and Department of State representatives." However, this document explained the CIA's interest not in terms of satellite design, operation, or management but rather because "the psychological warfare value of launching the first earth satellite makes its prompt development of great interest to the intelligence community and may make it a crucial event in sustaining the international prestige of the United States. There is an increasing amount

¹⁰⁷ NSC 5520, May 20, 1955, SPI document 86, pp. 2, 3, 4, 6, 11. Emphasis added. Most of NSC 5520 is reprinted in *Exploring the Unknown, Volume I*, but the version currently on file at SPI includes additional material resulting from recent declassification actions.

¹⁰⁸ Eisenhower, *Waging Peace*, 209.

¹⁰⁹ Memorandum of Discussion, 250th Meeting of the National Security Council, May 26, 1955, folder: 250th Meeting of NSC, box 6, NSC Series, Ann Whitman File, DDEL, 2. These memoranda of discussions of a particular date often had appended to them subsequent actions, such as Eisenhower approving on May 27 the space policy discussed on May 26 and so recorded in a May 26 memo.

¹¹⁰ *Ibid.*

of evidence that the Soviet Union is placing more and more emphasis on the successful launching of the satellite."¹¹¹

The CIA would contribute significant funds to the IGY satellite effort in the 1955-1957 time frame. It appears to have been looking to both to the prestige aspects of space and their impact on international opinion and towards developing a new method of gathering intelligence.

To maximize our cold war gain in prestige and to minimize the effectiveness of Soviet accusations, the satellite should be launched in an atmosphere of international good will and common scientific interest. For this reason the CIA strongly concurs in the Department of Defense's suggestion that a civilian agency such as the U.S. National Committee of the IGY supervise its development. . . . The small scientific vehicle is also a necessary step in the development of a larger satellite that could possibly provide early warning information through continuous electronic and photographic surveillance of the USSR. A future satellite could directly collect intelligence data would be of great interest to the intelligence community.¹¹²

Therefore, by mid-1955 not only had the principles of the long-term United States space policy been established, but the three-fold organizational structure of NASA-DoD-NRO, albeit in the form of an IGY program-DoD-CIA prototype, was also beginning to emerge.

A Civilian Program

The final link in the pre-Sputnik civil-military chain came when the IGY satellite program known as Vanguard began and the DoD again played a central role in that process, while the CIA was present with a shadowy, at-the-fringes type of presence. In fact the beginnings of the Vanguard project took place in exactly the same early to mid-1955 time frame in which the TCP report was released and acted upon via NSC 5520, making these months some of the most momentous in the American space program.

The origins of the IGY go back at least to April 5, 1950, when geophysicist James Van Allen gave a small dinner party for his colleagues such as Sydney Chapman, Lloyd Berkner, and S. Fred Singer.

¹¹¹ NSC document June 8, 1955, "Comments on the Report to the President by the Technological Capabilities Panel" cited above, p. A55. This vital NSC document, unearthed by the author in the recently declassified portions of the DDEL, is composed of sections contributed by all agencies interested in the space program resulting from the TCP recommendations such as the State Department, the DoD, and the CIA. Page A55 and A56 were contributed by the CIA and so directly reflect its assessment of its role in the burgeoning space program.

¹¹² Ibid., A56.

They concluded there was a need for numerous simultaneous observations at many points around the earth so conclusions could be drawn about the earth as a whole. Previously in 1882 and 1932 International Polar Years had taken place and Berkner recalled making the spontaneous suggestion for a third. Over the next several years this core group of American scientists would gradually incorporate the idea for an IGY into numerous and diverse scientific conferences and succeeded in "winning almost unanimous support everywhere." Since July 1957 to December 1958 was a period of maximum solar activity, this became the accepted duration of the IGY.¹¹³ Soon this process of scientific proselytizing became incorporated into geopolitics and the TCP/NSC 5520 chain of events outlined above.

For instance, A.N. Nesmeyanov of the Soviet Academy of Sciences told the World Peace Council in November 1953, "Science has reached a state when it is feasible . . . to create an artificial satellite of the earth."¹¹⁴ By the summer of 1954 a proposed civilian scientific satellite was a regular feature in scientific agendas. The International Union of Geodesy and Geophysics' declaration on September 20, 1954 is representative: "In view of the great importance of observations over extended periods of time of extra-terrestrial radiations and geophysical phenomena in the upper atmosphere and the advanced state of present rocket techniques, it is recommended that consideration be given to the launching of small satellite vehicles [with] their scientific instrumentation. . ."¹¹⁵ After numerous other such calls for action (International Scientific Radio Union, etc.), the International Council of Scientific Unions Special Committee for the IGY recommended the incorporation of scientific satellites into the official IGY experimental schedule. At every step of the way, the cadre of American geophysicists ensured the satellite as an agenda item received prompt attention.¹¹⁶ The NASA Historian concludes, "The fingerprints of

¹¹³ Jay Holmes, *America on the Moon: The Enterprise of the Sixties* (New York: J.B. Lippincott Co., 1962), 46-47; Constance Green and Milton Lomask, *Vanguard: A History*, NASA SP-4202 (Washington, DC: USGPO, 1970), 18ff.

¹¹⁴ Cited in Robert Lapidus, "Sputnik and Its Repercussions: A Historical Catalyst," *Aerospace Historian* 17 (Summer-Fall 1970): 90.

¹¹⁵ Appendix I to document II-9 in *Exploring the Unknown, Volume I*, 296.

¹¹⁶ See Bulkeley, 89-131 for a detailed account of the role of American scientists in initiating the IGY and campaigning for a satellite to examine the upper atmosphere as part of it.

these core leaders are all over every decision relative to IGY satellite program and the U.S. decision by Eisenhower to sponsor a satellite."¹¹⁷

By March 1955 the scientific concern started to merge with the military. The two most important scientific officials in this process, National Science Foundation (NSF) Director Alan Waterman and National Academy of Sciences President Detlev Bronk, regularly attended NSC meetings and so were privy to discussions concerning the TCP.¹¹⁸ The Chairman of the United States National Committee for the IGY wrote Waterman on March 14, 1955 to explain that the United States IGY representatives felt "a small, approximately fifty-pound, earth-circling satellite . . . would yield new geophysical data of considerable interest"and recommended the United States government include such vehicles in its rocket program.¹¹⁹ However, when Waterman passed this suggestion on to Deputy Undersecretary of State Robert Murphy, Waterman explained that the United States IGY Committee had been considering ". . . at the suggestion of the Assistant Secretary of Defense for Research and Development [Quarles] the feasibility and scientific importance of inclusion in the United States program of the launching of a small satellite. . . . Accordingly, in consideration of the interests of the Department of Defense and other agencies in this subject, and because of its importance from a public and international relations standpoint, Dr. Bronk and I wish to discuss . . . the initiation of such steps as may be necessary in arriving at the position of the Government with respect to this matter."¹²⁰

Therefore, sometime between the release of the TCP report on February 14 and the Waterman memorandum of March 18, 1955, Quarles of the DoD had approached the United States IGY Committee.

¹¹⁷ Roger D. Launius, "Eisenhower, Sputnik, and the Creation of NASA," *Prologue: The Quarterly Journal of the National Archives and Record Administration* (Summer 1996): 131.

¹¹⁸ See Eugene M. Emme, "Presidents and Space," in Frederick C. Durant III, Editor, *Between Sputnik and the Shuttle: New Perspectives on American Astronautics*, American Astronautical Society History Series, volume 3 (San Diego, CA: Univelt, Inc., 1981), 17.

¹¹⁹ Joseph Kaplan letter to Alan Waterman, March 14, 1955, folder: OCB 000.91 Natural & Physical Sciences (2), box: 11, OCB Central Files subseries, NSC: Staff Papers series, White House Office, DDEL, 1.

¹²⁰ Confidential Memorandum for Robert Murphy from Alan Waterman, March 18, 1955, 1, *ibid.* Emphasis added.

endorsed its pre-existing idea for a civilian scientific satellite and asked them to bring their request through Waterman, to the government. Quarles' private agenda included the freedom of space priority laid out in the TCP: the proposed IGY satellite fit the bill perfectly, including the fact that the idea for it was originated by civilian scientists and that civilian scientists, through Waterman, could bring it to the NSC for consideration. At that point the real priority of the government, establishing the right of overflight for reconnaissance satellites, could continue to operate completely behind the scenes, while the government had the luxury of defining the IGY satellite (Vanguard) as civilian and scientific in nature.

Quarles and Secretary of Defense Wilson quickly ensured Quarles' control of the flow of information regarding the DoD's role in the IGY satellite and control of the DoD's space policy. On March 28, 1955 he wrote the Secretaries of the Army, Navy, and Air Force:

I am informed that all three of the Military Departments have research and development programs or plans in the area of earth satellites, including certain proposals for a minimum 'scientific' satellite that might be feasible on a two- or three-year schedule. Because of the important policy questions involved, these departmental programs must be carefully considered and fully coordinated. The Assistant Secretary of Defense (Research and Development) [Quarles] is assigned responsibility for such coordination. Further funds will not be committed to work in this area without his prior approval.¹²¹

By the first week of April Quarles had briefed the military services on only the minimum necessary information concerning American space policy and the IGY satellite, not the entire geopolitical picture. Air Force records summarize the points Quarles covered as: the satellite itself would be unclassified and its characteristics would include information available to all; the means of delivery, however, would have to be some version of a military missile and so would be classified; the satellite was to be tied in with the IGY (but Quarles did not elaborate); the satellite would be a joint effort between the services and the NACA; until the United States made some kind of announcement, "all activities and studies should be highly classified."¹²²

Quarles then proceeded to draft the overall policy document, NSC 5520, in April and May 1955 and submitted it to the NSC for Eisenhower's approval in the last week of May 1955, as discussed above.

¹²¹ Secretary of Defense Charles Wilson, Memorandum for the Secretaries of the Army, Navy, and Air Force, March 28, 1955, K140.11-11, AFHRA, 1.

¹²² Memorandum for Record, Subject: Scientific Satellites, HQ USAF, April 5, 1955, *ibid.*, 1-2.

Events moved rapidly, given the fact the USSR on April 15, 1955 had announced the establishment of a Space Commission for Interplanetary Communications to produce "a remote controlled laboratory to circle the earth as a satellite and establish opportunities for observation of a hitherto inaccessible character."¹²³ During this entire process Quarles was careful to operate through Waterman so the process would appear as civilian- and scientifically-oriented as possible. For instance, on May 13, 1955, Waterman wrote Quarles, "*In accordance with our conversation before you left for Europe*, I discussed the subject [IGY satellite proposal] with Allen Dulles, with Richard Bissell present, the latter being the one in Central Intelligence who is following this closely." After assuring Quarles that he had thoroughly coordinated the IGY satellite issue with the Budget Bureau and with the State Department, Waterman then asked Quarles for suggestions concerning the best way for him (Waterman) to follow when he presented the whole package to the NSC in a few days.¹²⁴ Once again, the presence of the CIA from the earliest stages is evident; Richard Bissell was the CIA officer who would soon manage the U-2 program and after its resounding success would be called upon in 1958 to direct the CORONA program, America's first reconnaissance satellite.

The final step was to pick the organization responsible for managing the production, assembly, and launching of the IGY satellite, eventually to be known as Vanguard, and its launch vehicle. Not surprisingly, Quarles was given this responsibility. Given NSC 5520's admonition that the civilian scientific satellite not interfere with either the military reconnaissance satellite or other high priority defense projects since as the ICBM and that the IGY satellite effort should appear as civilian/scientific as possible, the outcome of this selection process was largely foreordained. The Air Force entry based on the Atlas rocket was rejected because the Air Force could not guarantee its construction would not interfere with IRBM and ICBM work. The choice between the Army's submission based on the Redstone/Jupiter IRBM and the Navy's entry based on sounding rockets operated by its Naval Research Laboratory (NRL) was

¹²³ Cited in Futrell, *Volume I*, 547.

¹²⁴ Confidential letter from Waterman to Quarles, May 13, 1955, 1-2, SPI unnumbered document. Emphasis added.

closer. But the overtly military nature of the Army's plan, based on a ballistic missile design (the Redstone was itself a modification of the Nazi V-2), handicapped it when compared to the NRL's submission based on the Viking rocket designed for atmospheric research. The NRL was given the official go-ahead in August 1955 to develop the Vanguard satellite for the IGY.¹²⁵ A comment by one member of the selection committee is instructive as to the future of the space age: "We finally decided that breaking the space barrier would be an easier task than breaking the interservice barrier."¹²⁶

The official announcement of the IGY satellite was on July 29, 1955 and emphasized its civilian pedigree: "This program will for the first time in history enable scientists throughout the world to make sustained observations in the regions beyond the earth's atmosphere."¹²⁷ Press Secretary James Hagerty explained, "The only connection the Department of Defense will have with this project is actually getting these satellites up in the air."¹²⁸ The public announcement of the IGY satellite came only after the USSR had rejected Eisenhower's bold "Open Skies" proposal at the Geneva summit meeting on July 21, 1955 that the United States and USSR ". . . give to each other a complete blueprint of our military establishments, from beginning to end, from one end of our countries to the other." This would have been coupled with the mutual provision of ". . . facilities for aerial photography to the other country - we to provide you the facilities within our country, ample facilities for aerial reconnaissance, . . . you to provide exactly the same facilities for us." Eisenhower felt the result would be ". . . to convince the world that we are providing as between ourselves against the possibility of great surprise attack, thus lessening danger and relax-

¹²⁵ The best Vanguard history is Green and Lomask. The complicated process whereby the Advisory Group on Special Capabilities of eight civilian scientists appointed by Quarles to select a specific project and contractor for the IGY satellite is described in detail in pages 30-55.

¹²⁶ Clifford Furnas, Chancellor of the University of Buffalo, cited in Green and Lomask, 51. Furnas would take Quarles' place as Assistant Secretary of Defense for Research and Development when Quarles became Secretary of the Air Force in August 1955.

¹²⁷ Statement by White House Press Secretary James Hagerty, July 29, 1955, folder: Eisenhower - Space Exploration (1952-63), box: White House, Presidents, Eisenhower, Space Statements, NHDRC, 1.

¹²⁸ Question and answer session after IGY announcement, reprinted in *New York Times*, July 30, 1955, 22.

ing tensions."¹²⁹ The Soviet refusal to even consider this proposal meant the IGY satellite had to go forward to attempt, among other purposes, to establish the legal right of satellite overflight for reconnaissance.

Vanguard, Prestige and Racing to Space?

Vanguard's history between August 1955 and the October 1957 launch of Sputnik is two years during which Eisenhower permitted its budget to mushroom, but not at a pace acceptable to its proponents. Prestige was often indicated as one factor at stake in being first to launch an earth satellite during this period, but Eisenhower seems not to have regarded this as important enough to merit either granting Vanguard an open-ended budget or permitting it to interfere with the top priority missile programs or the military reconnaissance satellite. Despite numerous staff meetings and reports highlighting the potential competitive aspects of the Soviet and American IGY satellite programs, Eisenhower did not conceive of the Vanguard program as engaging in any kind of a 'race' with the USSR. During this period most of Vanguard's funding was from DoD's emergency funds, with supplements from the NSF. However, the CIA also contributed budgetary support to the Vanguard program, cementing its role as a participant in the early American space program.

Immediately after the July 1955 announcement, the NSC established an Ad Hoc Working Group on Information Aspects of NSC 5520. It operated under a subdivision of the NSC called the Operations Coordinating Board (OCB). This group regularly defined one of Vanguard's purposes as deriving "... the maximum psychological advantage obtainable for the United States through domestic/foreign information output as generated by the U.S. decision to launch earth satellites. . . . Recent intelligence tends to confirm the belief that the Soviets may already possess a capability to launch an earth satellite. . . ."¹³⁰ The OCB saw the problem as

The international position of the U.S. (in terms of prestige and morality) will be somewhat damaged by the fact that the program is being implemented by the military rather than by

¹²⁹ Eisenhower's Statement on Disarmament, Geneva Conference, July 21, 1955, *Public Papers of the Presidents, 1955* (Washington, DC: USGPO, 1959), 715.

¹³⁰ Public Information Program With Respect to the Implementation of NSC 5520, July 1955, folder: OCB 000.91 Natural & Physical Sciences (2), box 11, OCB Central File subseries. NSC Staff Papers series, White House Office, DDEL, 1.

purely scientific agencies. It will therefore be necessary to build the information program carefully, giving emphasis to the international nature of the experiment, and the availability of the results to the international scientific community. The role of the military must be described for what it actually is, i.e., the assignment of the task to the only agency of the Government possessed of the necessary technical knowledge and facilities to do the job. . . . A combined domestic/foreign information program is required if the potential psychological advantage inherent in the earth satellite program is to be secured for the U.S.¹³¹

By the next year, Vanguard's backers were warning, "In the popular minds throughout the world, the first successful launching is becoming a symbol of technical superiority in the contest between the U.S. and the USSR. There is currently no emphasis in the U.S. program on the timing of the first satellite shot."¹³² The scientific community also informed the administration that "Failure by the U.S. to launch satellites successfully during the IGY in the light of this [Soviet] commitment would result in loss of U.S. scientific prestige that would be compounded by successful Soviet launching."¹³³ Therefore, the NSF concluded, "It is vitally important in terms of the stated prestige and psychological purposes that the United States make every effort to (a) make possible a successful launching as soon as practicable and (b) put on as effective an IGY scientific program as possible."¹³⁴

The federal government was also not surprised by Soviet progress in their IGY satellite program nor by its readiness for launch in October 1957. A CIA National Intelligence Estimate (NIE) in December 1955 concluded concerning a Soviet earth satellite that ". . . the Soviets are attempting to develop such a vehicle at the earliest practicable date. . . . We believe that the USSR would place considerable emphasis on such a vehicle, primarily to achieve psychological effect."¹³⁵ NSC records from November 1956 clearly state, "The USSR can be expected to attempt to launch its satellite before ours and to attempt to

¹³¹ Ibid., 2.

¹³² David Z. Beckler, Special Assistant for Scientific Liaison, Office of Defense Mobilization, Memorandum to Director of the Office of Defense Mobilization Arthur S. Flemming, April 30, 1956, folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC, 2. Emphasis in original.

¹³³ Letter from I.I. Rabi to Flemming, October 10, 1956, *ibid.*, 1.

¹³⁴ Annex B, p. 2. *ibid.*

¹³⁵ CIA NIE 11-12-55, Soviet Guided Missile Capabilities and Probable Programs, December 20, 1955, folder: CIA, box: Federal Agencies, CIA, National Intelligence Estimates, shelf XI-B-3, NHDRC, 3, 7.

surpass our effort in every way. . . . It would be prudent to assume that the USSR will orbit a satellite with limited instrumentation for scientific purposes at any time after early 1957."¹³⁶ In March 1957 the CIA concluded, "The USSR will probably make a major effort to be the first country to orbit an earth satellite. We believe that the USSR has the capability of orbiting, in 1957, a satellite vehicle. . . ."¹³⁷ In June 1957 OCB representatives stated the NSC expected the Soviets to launch an earth satellite "soon, literally in the next few months." The OCB then ordered all government departments and agencies to take "the necessary precautionary measures from a public relations standpoint to insure that the United States disclaim any intention of engaging in a race with the Soviets to launch the first satellite."¹³⁸

The central point, however, is simply because the machinery of the executive branch emphasized again the competitive, prestige-related aspects of Vanguard did not mean that Eisenhower subscribed to this notion. In fact, he did not before Sputnik and would make only limited concessions to the space for prestige notion after Sputnik. In the summer of 1955 Vanguard's original budget estimate was \$20 million. Eisenhower permitted numerous supplemental appropriations until program completion at a cost of over \$110 million.¹³⁹ However, his insistence that Vanguard not interfere with the priority military projects and that it not receive unlimited funds meant its backers could not conduct an all-out, competitive race with the Soviets as part of drive to capture international prestige.

For instance, at an OCB meeting in October 1955, Vanguard's cost had increased to an estimated \$23.5 million. Quarles "warned that efforts must be made to avoid 'expansion' of the program and urged caution in expenditures exceeding \$20,000,000. He said there is 'validity' in this ceiling as far as the White House is concerned."¹⁴⁰ By April 1956 the estimated cost had risen to \$60 million¹⁴¹ and the next

¹³⁶ NSC Planning Board Report, "U.S. Scientific Satellite Program," November 9, 1956, folder: NSC 5520 - Satellite Program (1), box 16, Policy Papers subseries, NSC Series, OSANSA, White House Office, DDEL.

¹³⁷ Reprinted in Donald P. Steury, Editor, *Intentions and Capabilities: Estimates on Soviet Strategic Forces, 1950-1983* (CIA: Center for the Study of Intelligence, 1996), 62.

¹³⁸ NSC, OCB, Memorandum of Meeting, June 13, 1957, folder: OCB Working Group on Earth Satellites, box 1, National Aeronautics and Space Administration series, DDEL, 1.

¹³⁹ Green and Lomask, 130.

month the NSC tried to clarify the budgetary situation by refusing to either cancel or slow down Vanguard but continuing the program “. . . with the understanding that the program developed . . . will not be allowed to interfere with the ICBM and IRBM programs but will be given sufficient priority by the Department of Defense in relation to other weapons systems to achieve the objectives of NSC 5520.”¹⁴² At this May 3, 1956 NSC meeting Secretary of the Treasury George Humphrey complained the cost of the six Vanguard satellites “was already going out of sight.” Eisenhower added “that he had not been notably enthusiastic about the earth satellite program when it had first been considered by the National Security Council, but that we certainly could not back out of it now. The President could not imagine the United States having made an announcement that it proposed to launch an earth satellite and then failing to deliver on its commitment.”¹⁴³

By January 1957 the new Assistant Secretary of Defense for Research and Development Clifford Furnas “. . . indicated that the program was essentially on schedule” but Special Assistant for National Security Affairs Robert L. Cutler reported the program’s costs had escalated to \$83 million. To this Secretary of Defense Wilson replied, “The fact is that we were running out of money in the Department of Defense [and] that if we were going to spend another \$30 million there are other things that the Department of Defense would like to buy. . . . The President indicated his general agreement with the position taken by Secretary Wilson, pointing out the original program had now risen from \$20 million to greater than \$80 million.” Since the DoD could not continue to bear most of the financial burden, “The President

¹⁴⁰ NSC. OCB. Pentagon briefing memo on earth satellite program, October 12, 1955, folder: OCB 000.91 Natural and Physical Sciences (3), box 11, OCB Central File Subseries, NSC Staff Papers series, White House Office, DDEL, 1.

¹⁴¹ David Z. Beckler, Memorandum for William Y. Elliott, April 18, 1956, folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC, 1.

¹⁴² Memorandum of Discussion, 283rd meeting of the National Security Council, May 3, 1956, reprinted in John P. Glennon, Editor in Chief, *Foreign Relations of the United States, 1955-1957, Volume XI, United Nations and General International Matters (FRUS)* (Washington, DC: USGPO, 1988), 741.

¹⁴³ *Ibid.*, 737.

turned to the Director of the Budget, and said that he would simply have to 'scratch around' and get this additional \$17 million out of existing appropriations."¹⁴⁴

Part of this "scratching around" turned out to be CIA funding. The Budget Bureau (BoB) Director Percival Brundage wrote Eisenhower on April 30, 1957 to explain that now Vanguard couldn't be completed even for the \$83 million previously discussed. DoD had provided \$50 million of the \$70 million spent so far and yet an overall total of \$110 would probably be required. Brundage also reported, "The CIA has made \$2.5 million available to the Department of Defense" and the NSF \$5.8 million. But the DoD now considers it "not advisable . . . to provide further support of the project" from its emergency fund.¹⁴⁵ By mid-1957 then both the DoD and the CIA had direct financial interests in America's civilian scientific IGY satellite program, illustrating once again ". . . the confluence of both civilian and military security interests in the early space program."¹⁴⁶

Nonetheless, the NSC had to take up Vanguard's budgetary crisis once again. At the May 10, 1957 meeting Eisenhower listened to the explanation of the now-anticipated \$110 million cost and "interrupted with a vigorous complaint" concerning the "very costly instrumentation" on Vanguard because "the element of national prestige, so strongly emphasized in NSC 5520, depended on getting a satellite into its orbit, and not on the instrumentation of the scientific satellite."¹⁴⁷ It becomes clear that the question of Eisenhower and space for prestige is not a simple black and white matter but rather deals with shades of gray. He didn't completely discount the notion of prestige derived from space accomplishments. However, he was not willing to pay what he considered an inordinate amount of money or let space for prestige interfere with space for defense.

¹⁴⁴ NSC, Memorandum, Discussion at the 310th Meeting of the NSC, January 24, 1957, folder: 310th Meeting of the NSC, box 8, NSC series, Ann Whitman file, DDEL, 1, 3-4, 6.

¹⁴⁵ Percival Brundage, Memorandum for the President, Subject: Project VANGUARD, April 30, 1957, folder: Missiles and Satellites Vol. I (1), box 6, Department of Defense subseries, Subject series, Office of the Staff Secretary: Records, White House Office, DDEL, 1-2.

¹⁴⁶ Dwayne Day, "Invitation to Struggle," *supra*, 245.

¹⁴⁷ *FRUS*, 748-49.

At this seminal May 1957 NSC meeting CIA Director Allen Dulles pointed out that "If the Soviets succeeded in orbiting a scientific satellite and the United States did not even try to, the USSR would have achieved a propaganda weapon which they could use to boast about the superiority of Soviet scientists." Secretary of State Christian Herter concurred with the sentiment to continue with Vanguard "... because of the prestige it would confer on the United States." Eisenhower said he "did not see how the United States could back out of the earth satellite program at this time" but "he was much annoyed by this tendency to 'gold-plate' the satellite in terms of instrumentation." Wilson summarized, "... the satellite program had too many promoters and no bankers." In the end, Eisenhower directed the Waterman, Brundage, and Wilson to ask Congress for a supplemental appropriation specifically for Vanguard.¹⁴⁸ In August 1957 Congress provided \$34.2 million and Vanguard had its own source of funds until NASA took over the project in October 1958.

The charge that Eisenhower ignored the space for prestige angle before Sputnik is therefore not accurate. Indeed, over the course of 1957 when Eisenhower accepted increases in Vanguard's cost up to the final \$110 million level, Congress was in the midst of an economy drive in which it threatened to cut \$2 billion from Eisenhower's request for missiles and aircraft. Far from parsimonious, Eisenhower's defense budget was "the largest peacetime request in the history of the United States."¹⁴⁹ Eisenhower did accept the original IGY satellite proposal; he did accept a five-fold increase in its budget; he did give Vanguard a top priority just below ballistic missiles, a status enjoyed by no other research project of the day. What he did not do was write a blank check for Vanguard that would enable it to engage in an all-out prestige race with the Soviet effort. This level of reservation, however, was sufficient to permit the Soviets to launch first.

Therefore, while the Eisenhower administration was clearly advised of the prestige value of being first into space, this motivation had the lowest priority of the several present in early American space policy. As McDougall explains, two sets of circumstances could prepare the way for reconnaissance satel-

¹⁴⁸ Ibid., 750-53.

¹⁴⁹ Eisenhower, *Waging Peace*, 209; Bulkeley, 202.

lites: "One was if the United States got away with an initial small satellite orbiting above the nations of the earth 'for the advancement of science' - and had no one object to it. The other way was if the Soviet Union launched first. The second solution was less desirable, but it was not worth taking every measure to prevent."¹⁵⁰ By way of example, few dispute that the continuing tests of the Army's Jupiter IRBM in 1956 could have placed a satellite into orbit. But as Eisenhower explained, the DoD and NSF "... showed little inclination either to drop Vanguard, already well under way, or to divert the Redstone group from missiles to satellite work. Since no obvious requirement for a crash satellite program was apparent, there was no reason for interfering with the scientists and their projected time schedule."¹⁵¹

The effort to gather scientific information about space and the upper atmosphere with a civilian scientific satellite which, it was hoped, would simultaneously establish a right of passage for later military reconnaissance satellites, is collectively referred to as the "space for peace" policy. As described in this chapter, the space for peace thesis clearly dominated the pre-Sputnik space policy of the Eisenhower administration because it "constituted the intellectual medium in which the program took shape during its early years."¹⁵² While the idea that space would emerge as an arena in which the superpowers competed for prestige was not an unknown idea in the Eisenhower space policy, it was not a prime mover. More important was the not unreasonable "... hope that international agreements would recognize some specific distance above the earth as analogous to the three-mile limit [at sea], beyond which there would be freedom of space comparable to freedom of the seas."¹⁵³

¹⁵⁰ McDougall, 123-24.

¹⁵¹ Eisenhower, *Waging Peace*, 209. A Jupiter-C launched on September 20, 1956 had the propellant in its fourth stage engine replaced with sand by direct order of the OSD. See Herbert F. York and G. Allen Greb, "Strategic Reconnaissance," *Bulletin of the Atomic Scientists* (April 1977): 39. This missile flew to an altitude of 682 miles at a velocity of 13,000 mph while traveling 3355 miles down range, all well within acceptable parameters for inserting a satellite into orbit. See McDougall, 130.

¹⁵² Bowen, 58.

¹⁵³ *Ibid.*, 60.

NASA's Predecessor Organization and the DoD

A brief synopsis of the relevant history of the National Advisory Committee for Aeronautics (NACA) must stand as an addendum to this chapter because it does not fit neatly into the preceding chronologically-oriented narrative flow but nevertheless is an important pre-Sputnik trend. Since the NACA was the nucleus from which NASA was formed, and since the NACA's history was intimately tied to the military, it forms an important foundation stone of the civil-military story of the space age.

Between 1908 and 1913 the United States spent only \$435,000 on aviation development, less than nations such as Japan, China, Bulgaria, Greece and Brazil. As a result, when World War I (WWI) began in 1914 the United States had only 23 military aircraft, all technologically obsolete, when compared to France with 1,400, German 1,000, Russia 800 and England 400.¹⁵⁴ In the wartime environment most European governments encouraged their scientists, engineers, and governments to further aeronautical R&D but the United States lagged, where airplane development was left to "a host of amateur inventors."¹⁵⁵ Some prominent Americans began to see this backwardness as "... not only a national disgrace, but a possible danger to our security."¹⁵⁶ Backers of an American national aeronautical laboratory included Smithsonian Institution Secretary Charles Walcott and Alexander Graham Bell. Their efforts were stymied until the crisis environment of WWI increased.

In fact, the legislation finally founding the NACA in 1915 was attached as a rider to a naval appropriations bill, "a piece of legislation assured of passage, what with the war in Europe and the bipartisan support then abounding for a strong Navy."¹⁵⁷ From this point forward and until it was transformed into NASA in October 1958, the history of the NACA and its R&D was closely tied to national security

¹⁵⁴ Jerome C. Hunsaker (NACA Chairman from 1941-56), "Forty Years of Aeronautical Research," in *Forty Fourth Annual Report of the National Advisory Committee for Aeronautics, 1958, Final Report* (Washington: USGPO, 1959), 4.

¹⁵⁵ *Ibid.*, 3.

¹⁵⁶ *Ibid.*, 4.

¹⁵⁷ Roland, *Model Research, Volume 1*, 5. Roland's volumes are far and away the best comprehensive survey of the NACA. Numerous other scholars make the same point: "The enabling legislation for the NACA slipped through almost unnoticed as a rider attached to the Naval Appropriations Bill. . .". Roger Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990*, NASA SP-4406 (Washington, DC: USGPO, 1989), 3.

and the fortunes of the military services. The bill was passed on March 3, 1915 created an Advisory Committee on Aeronautics ("National" was added at the first official meeting in April) with 12 members: two from the War Department, two from the Navy, one each from the Smithsonian, Weather Bureau, and National Bureau of Standards, with five from the scientific community. The Naval Affairs Committee of Congress concluded, "There does not appear to be any good reason why America should not be fully abreast of, if not in advance of, other nations in the development of aeronautics in a practical and useful way, not only for the purposes of war but for other activities where great speed in transit. . . is desirable."¹⁵⁸ Their legislative tasking was to ". . . supervise and direct the scientific study of the problems of flight, with a view to their practical solution," with a first year budget of \$5,000.¹⁵⁹

By the end of WWI NACA's budget was \$85,000. Construction began in 1917 on its major facility, the Langley Memorial Aeronautical Laboratory, which was dedicated on June 11, 1920. In the period before WWII the NACA become more and more a research organization working on the questions raised by its primary clients: the growing American aircraft industry but especially the War and Navy Departments. For instance, one of the NACA's premier accomplishments in the interwar era was the invention of a cowlings that provided superior cooling for radial aircraft engines. But Alex Roland points out, "What is less well known is that the military services had been the first to ask the NACA to investigate cowlings of radial engines. . . . It was the military that had submitted the first formal request and it was the military for whom the first research authorization on the subject was approved." This 1926 request, "Like all requests from the military . . . was assigned a research authorization and work began on a prototype."¹⁶⁰

This close relationship with the military greatly assisted in NACA in justifying its existence and securing funding during the Great Depression, during which its budget fell by one-third. Despite its importance as a precursor to spaceflight, the aircraft industry was still relatively small during the interwar

¹⁵⁸ Congress, House, Committee on Naval Affairs, *National Advisory Committee for Aeronautics*, Report No. 1423, 63rd Congress, 3rd Session, February 27, 1915, 5.

¹⁵⁹ Hunsaker, 5.

¹⁶⁰ Roland, *Model Research*, Volume 1, 115.

period; in 1929 its expenditures were less than the sales of straight pins.¹⁶¹ Overall, the NACA remained "obscure, humble, and poor," with peak peacetime funding of only \$3.1 million in 1940.¹⁶² It was not an operating agency in the sense of conducting missions or actual flights. It owned no aircraft because it did research on aircraft loaned by the military or industry, and it had no contracting authority. "It received its meager funds through military appropriations, and most of its facilities were co-located at military air bases." Its total budget, 1915-1940 was \$31 million.¹⁶³ NACA facilities such as wind tunnels, and NACA research on topics such as laminar flow, retractable landing gear and all-metallic aircraft structures, were indispensable in the development of the military aircraft that would see combat in WWII. As NACA's director for aeronautical research George Lewis often remarked, "If the NACA ever sets itself aside from the Army and Navy, it is a 'dead duck.'"¹⁶⁴

WWII saw NACA's size increase several times. Staffing grew from 480 in 1938 to 5,453 in 1945; funding jumped from \$1.28 million to \$40.9 million during that same time period.¹⁶⁵ It built two more laboratories, the Ames Aeronautical Laboratory 40 miles south of San Francisco and the Lewis Flight Propulsion Laboratory in Cleveland. During the war the NACA "... worked for the military essentially on a support basis" as the NACA and the military services exchanged personnel, facilities and equipment almost casually. NACA engineers and scientists used their wind tunnels and other research equipment to create new aerodynamic theories and solve specific problems with particular aircraft; "The military services and industry took the job from there and designed and produced the airplanes."¹⁶⁶ The

¹⁶¹ Neufeld, *Research and Development in the United States Air Force*, 19.

¹⁶² McDougall, 75.

¹⁶³ Glen P. Wilson, "Lyndon Johnson and the Legislative Origins of NASA," *Prologue: Quarterly Journal of the National Archives* 25 (Winter 1993): 363.

¹⁶⁴ Roland, *Model Research, Volume 1*, 141.

¹⁶⁵ *Ibid.*, *Volume 2*, 471-72, 489.

¹⁶⁶ Congress, House, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*. Thirteenth Report, 89th Cong. 1st Session, House Report No. 445, June 4, 1965, 22.

NACA's basic wartime task was "testing, cleanup, and refinement of military prototypes [for] immediate use in the war."¹⁶⁷ Declared NACA Executive Secretary John Victory in 1943, "All of the research activities of the National Advisory Committee for Aeronautics are connected with immediate and vital problems of the Army and Navy air organizations, and all the results constitute classified information."¹⁶⁸

Current NASA Historian Roger Launius explains that WWII transformed NACA "... from a sleepy R&D organization created to experiment and solve the problems of flight for the military, the civil aviation industry, and the airlines ... to a much larger institution that, after 1939, was more firmly wedded to military aviation."¹⁶⁹ Launius notes, "Relations between NACA and the military had always been amicable, but they became especially so after wholesale changes on the committee reoriented it toward acquiescence in military prerogatives."¹⁷⁰ NACA Chairman Jerome Hunsaker said that by Pearl Harbor 71 percent of NACA work was on specified military projects: Director of NACA aeronautical research George Lewis told Congress in 1943 that NACA spent 100 percent of its time on applied military aeronautical research. Though Launius believes that latter assertion is questionable, he does conclude that during WWII most of the NACA's effort "... was either directly for the benefit of the military or for industry developing military airplanes."¹⁷¹ Therefore, "Without NACA, American aerial supremacy, won and held at least by the first part of 1944, would have been less complete. Every airplane that fought in the war was tested and improved in NACA laboratories."¹⁷²

¹⁶⁷ Roland, *Model Research*, Volume 1, 167.

¹⁶⁸ *Ibid.*, 179.

¹⁶⁹ Roger Launius, "'Never was Life More Interesting': The National Advisory Committee for Aeronautics, 1936-1945," *Prologue: Quarterly Journal of the National Archives* (Winter 1992): 361.

¹⁷⁰ *Ibid.*, 366.

¹⁷¹ *Ibid.*, 367. James R. Hansen, *Engineer in Charge: A History of Langley Aeronautical Laboratory, 1917-1958*, NASA SP-4305 (Washington, DC: USGPO, 1987), 161, gives reliable figures for the percentage of all NACA research authorizations which were military requests: 1920-25, 27 percent; 1926-30, 55 percent; 1931-35, 50 percent; 1936-40, 63 percent; 1940-41, 88 percent. This clearly indicates the close ties between the NACA and the military both before and during WWII.

¹⁷² Launius, "'Never was Life More Interesting.'" 371.

After WWII NACA did hew a slightly more independent line but still continued to work closely with the DoD in propulsion research (the famous rocket-powered X-series aircraft in which Chuck Yeager and his successors broke, and then flew well beyond, the sound barrier, as well as the more down-to-earth jet engine research¹⁷³), perfecting aircraft designs, and ballistic missile designs. By 1949 the BoB shifted NACA's budgetary classification from "Transportation and Communications" to "National Defense" because the BoB concluded all of NACA's growth in the previous decade "had been based entirely on military considerations" and "all NACA officials agree that the primary mission of the agency for the foreseeable future was military in nature."¹⁷⁴

For instance, the NACA's H. Julian Allen in 1951-52 discovered a solution to a serious problem associated with ICBMs: how to deal with the high temperatures generated by aerodynamic heating during reentry. In place of a sleek rifle-shell configured with a sharply pointed nose, he proved the efficacy of a blunt-body shape designed to build up a powerful bow-shaped shock wave that deflected the heat safely outward and away from the reentry vehicle's main structure. This slightly-curved, blunt-body design was incorporated into America's first generation ICBMs (until ablative reentry materials were perfected) and into NASA's later Mercury, Gemini, and Apollo space capsules. After WWII, NACA did enough research into missiles and rockets to merit the establishment of the Pilotless Aircraft Research Division, under Langley, at Wallops Island, VA. NASA officials later characterized the NACA's missile work as

¹⁷³ This series culminated with the X-15. Some analysts consider this a spacecraft and thus germane to the NACA-DoD human spaceflight discussion. The present author concedes it was a NACA-DoD cooperative venture in which NACA provided technical administration, the Air Force and Navy provided financing, and the Air Force provided overall administration, but disputes its classification as a spacecraft. It is more correctly categorized as "... more an experiment in high speed flight than an effort to achieve a sustained or deep penetration into space" and therefore not particularly relevant to this dissertation. See Alan L. Dean, who was the senior management analyst in the BoB concerned with NACA/NASA, DoD and scientific R&D, and who helped draft the National Aeronautics and Space Act, "Mounting a National Space Program," in Henry Jarrett, editor, *Science and Resources: Prospects and Implications of Technological Advance* (Baltimore: The Johns Hopkins University Press, 1959), 221. The X-15 first flew on September 17, 1959 and the three aircraft made 199 flights before retiring in December 1968, after flying at mach 6.72 (4520 mph) and 67 miles (354,000 ft.) There are numerous histories of the X-15; for a scholarly examination see "Transiting from Air to Space: The North American X-15", by Robert S. Houston, Richard P. Hallion, Ronald G. Boston, in Richard P. Hallion, editor, *The Hypersonic Revolution: Eight Case Studies in the History of Hypersonic Technology*, volume 1 (Special Staff Office, Aeronautical Systems Division, Wright-Patterson AFB, OH, 1987).

¹⁷⁴ Cited in Roland, *Model Research*, Volume 1, 261.

consisting of “. . . studies of basic problems in aerodynamics, structures, and propulsion . . . undertaken often on request of the sponsoring military services. . . . Its function [NACA's] is to provide fundamental scientific information that will be useful to the military services and to manufacturers in the design and development of missiles of superior performance.” By January 1950, the NACA reported approximately 30 percent of its research effort was applicable to missiles.¹⁷⁵ This almost certainly involved a very liberal definition of applicability.

NACA did not immediately welcome the advent of space-related R&D. NACA continued to make excellent progress in aeronautics: “Space flight, however, was something else.”¹⁷⁶ When informed during in 1940 by GALCIT of the military's interest in rockets, NACA Chairman Hunsaker replied, “You can have the Buck Rogers jobs.”¹⁷⁷ Christopher Kraft was a long-time NACA employee who would become famous as Director of NASA's Flight Operations. He recalled space was considered a dirty word in NACA before Sputnik and that the word ‘space’ “. . . wasn't even allowed in the NACA library. The prevailing NACA attitude was that if it was anything that had to do with space that didn't have anything to do with airplanes, then why were we working on it?”¹⁷⁸ Robert Seamans would serve as Associate and then Deputy Administrator of NASA but was on a NACA subcommittee in 1948 that openly asked what the NACA was doing to prepare America for possible space activity. He reported, “We had our wrists slapped. We were told that the NACA was for aeronautics, period. Forget space.”¹⁷⁹

General James A. Doolittle became NACA Chairman in 1956 after Hunsaker concluded he, Hunsaker, was ill-equipped by temperament and training to cope with new the new technologies and chal-

¹⁷⁵ “NACA Research on Missiles,” 1958, folder: Testimony on Space Act, box: White House, Presidents, Eisenhower, National Aeronautics and Space Act (cont.), Space Act Testimony, NHDRC, 1.

¹⁷⁶ Swenson, et. al., 11.

¹⁷⁷ Cited in Richard Hirsch and Joseph Trento, *The National Aeronautics and Space Administration* (New York: Praeger Publishers, 1973), 7.

¹⁷⁸ Cited in James R. Hansen, *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo*, NASA SP-4308 (Washington, DC: USGPO, 1995), 17-18.

¹⁷⁹ Robert C. Seamans, Jr., *Aiming at Targets* (Beverly, MA: Memoirs Unlimited, 1994), 85.

lenges of the space age.¹⁸⁰ Doolittle had an earned doctorate in aeronautics from MIT, served as a Lieutenant General in the Army Air Forces in WWII and was a successful executive with the Shell Oil Company. He explained the leaders of NACA "sort of dragged our feet" about astronautics. "We knew the rocket was coming [and] while we knew that space must be explored, we were hesitant to turn over to the missile people and their supporters all of the funds that we had been receiving for the development of the airplane and associated equipment." He admitted in hindsight NACA was wrong on this count but emphasized,

We in the old NACA were I think mentally circumscribed, to the extent that we never could have realized the potential of growing not six times but sixty times bigger in a short period of time, because we had fought very hard each year in order to get the little increases that we needed in order to build up over a period of a great many years to \$100 million a year. . . . It was only that we began to take quantum steps when we began to get quantum bucks. . . . NACA, like every other governmental agency, had to fight every year for its appropriations. It never got what it wanted to do its job, and frequently it got appropriations on the basis of 'You will use it for this and nothing else.'¹⁸¹

NACA engineer Ira H. Abbott summarized that until Sputnik took space out of the realm of science fiction and made it a part of the cold war, the NACA "would have stood as much chance of injecting itself into space activities in any real way as an icicle in a rocket combustion chamber."¹⁸²

The combination of directed appropriations and a constrained fiscal environment meant the NACA was only too happy to leave space exploration to the Air Force, with its reconnaissance satellite, and the NRL's Vanguard. In turn, this facilitated a continued smooth relationship with the DoD because the DoD enjoyed NACA's responsiveness to its research requests with missiles and the DoD did not feel that NACA had any desire to poach on the new and potentially glamorous field of space R&D. After Sputnik, when NACA did decide its institutional existence depended on being named the organization

¹⁸⁰ Roland, *Model Research, Volume 1*, 283.

¹⁸¹ Oral history interview of James H. Doolittle, April 21, 1969, AFHRA K239.0512-625, pp. 6, 30, 32.

¹⁸² Cited in Virginia P. Dawson, "The Push from Within: Lewis Research Center's Transition to Space," in Martin J. Collins and Sylvia D. Fries, editors, *A Spacefaring Nation: Perspectives on American Space History* (Washington, DC: Smithsonian Institution Press, 1991), 168-69.

responsible for America's civilian space exploration program, it was only through the most liberal of definitions of space-related R&D that NACA was able to claim that 50 percent of its activities were "space related."¹⁸³ More objective is McDougall's assessment. "By the mid-1950s, the venerable NACA was slumping."¹⁸⁴

The DoD and Air Force would probably have been happy to see this status quo continue after Sputnik. Schriever stated that the NACA "... worked extremely well with the military and commercial sides. There were no sandboxes, no jealousies among the organizations. It was a happy family."¹⁸⁵ Others closely familiar with the NACA-DoD/Air Force situation concur. An admiral who later headed NASA's Office of Defense Affairs averred that for the 43 years before NASA, the NACA and the DoD enjoyed "a very harmonious and productive relationship. . . . The relationship was a simple and direct one, generally devoid of any contest in roles and missions."¹⁸⁶ Such paeans as "... the long history of NACA's relationship with the military has been the relationship of a trusted supplier to an active orderer"¹⁸⁷ could occupy many pages.

With Sputnik's repeated beeping, this would all change.

¹⁸³ Robert L. Rosholt, *An Administrative History of NASA: 1958-1963*, NASA SP-4101 (Washington, DC: USGPO, 1966), 6.

¹⁸⁴ McDougall, 164.

¹⁸⁵ Oral history interview with the author, July 2, 1996.

¹⁸⁶ W. Fred Boone, *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32 (Washington, DC: USGPO, 1970), 6. A bevy of official agreements made official this NACA-DoD relationship. See for instance "On Assignment to the National Advisory Committee for Aeronautics Certain Officers of the United States Army for Reserve for Extended Active Duty," July 27, 1956 and similar agreements for the Air Force and Navy same date, no folder, box: Civilian-Military Liaison Committee, NHDRC; "Wartime Role of NACA In Support of Department of Defense," March 21, 1957, folder: Copies of Agreements, DoD subseries, Federal Agencies series, NHDRC; and "Air Force Support for NACA Research Activities," July 8, 1957, folder: Minutes of CMLC Meeting - January 13, 1959, box: Civilian Military Liaison Committee, NHDRC.

¹⁸⁷ Congress, House, Select Committee on Astronautics and Space Exploration. *The National Space Program*, report, 85th Congress, 2nd Session, May 21, 1958, 13.

3. Eisenhower's Philosophy in Action I: Reaction to Sputnik and the Birth of NASA

Sputnik revealed the psychological vulnerability of our people. The communists were steadily fomenting trouble and rattling sabers; our economy was sputtering somewhat, and the ceaseless and unhealthy self-criticism in which we of the United States indulge had brought a measure of genuine self-doubt.¹

There is no clear analogy in American history to the crisis triggered by the launching of the Soviet earth satellite. . . . It immediately set in motion forces in American political life which radically reversed the Nation's ruling conception of its military problem, of the appropriate level of the budget, and of the role of science in its affairs.²

The space program was a paramilitary operation in the Cold War, no matter who ran it. All aspects of national activity were becoming increasingly politicized, if not militarized.³

Perhaps the most disturbing thing about Sputnik was the paradox of its undeniable importance and its imprecise significance.⁴

Eisenhower Tried to Calm the Waters

On October 4, 1957 the Soviet Union launched the first artificial satellite around the earth. Sputnik I. At first many administration officials deprecated the Soviet accomplishment. Rear Admiral Rawson Bennett, director of the Office of Naval Research (the organization ultimately responsible for the Vanguard effort) declared it was "a hunk of iron anybody could launch" while Eisenhower's chief of staff Sherman Adams quipped that ". . . the serving of science, not high score in an outer space basketball game, has been and still is our country's goal."⁵ Trade representative Clarence Randall referred to Sput-

¹ Dwight D. Eisenhower, *Waging Peace: 1956-1961* (NY: Doubleday & Company, Inc., 1965), 226.

² Walter Rostow, *The United States in the World Arena: An Essay in Recent History* (New York: Harper & Row, 1960), 356.

³ Walter McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age*, (New York: Basic Books, Inc., Publishers, 1985), 174.

⁴ Lee Bowen, *An Air Force History of Space Activities, 1945-1959*, (Washington, DC: USAF HDLO, 1964), SHO-C-64/50, p. 181.

⁵ Cited in Richard Witkin, *The Challenge of the Sputniks* (New York: Doubleday, 1958), 6.

nik as a "silly bauble" while Secretary of Defense Wilson said it was "a neat scientific trick" but, "Nobody is going to drop anything down on you from a satellite while you are sleeping, so don't start to worry about it."⁶ Legislative liaison Bryce Harlow later concluded he did a great disservice to Adams by writing the 'basketball' remark but "... that really kind of was the context of that time inside the thinking of the White House."⁷

As national alarm appeared to grow, however, calmer administration heads prevailed. In this situation, it was Vice President Richard M. Nixon who perceived, "We could make no greater mistake than to brush off this event as a scientific stunt. We have a grim and timely reminder . . . that the Soviet Union has developed a scientific and industrial capacity of great magnitude."⁸ The tone the Eisenhower administration took over the long term was in accordance with his philosophy outlined last chapter: Sputnik was not a military threat of such severity that a crash response was necessary; America should remain calm and take a reasoned, rational approach to determining the proper pace and structure of a civilian organization for space activities. Meanwhile, the military's space R&D associated with reconnaissance satellites would continue and in February 1958 be placed under a new organization called the Advanced Research Projects Agency (ARPA) designed to temper interservice rivalries, because the new conclusion was that Sputnik's free passage established the international principle of a legal right of overflight and so Vanguard's significance in this matter receded.

In a conference with his advisers on October 8, Eisenhower set the tone, saying "... his intent was not to belittle the Russian accomplishment. He would like, however, to allay hysteria [sic] and alarm, and to bring out that the Russian action is simply proof of a thrust mechanism of a certain power, accuracy and reliability."⁹ NSC's OCB issued guidance that same day instructing agencies of the government

⁶ Cited in Lyndon B. Johnson, *The Vantage Point: Perspectives on the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), 273.

⁷ Harlow, Bryce, oral history of, Deputy Assistant to the President for Congressional Affairs, June 11, 1974. Folder: Bryce Harlow interview, box: White House, Presidents, Eisenhower (cont.), DOD/CIA Information, Eisenhower, John S.D. - Lodge H.C., NHDRC, 46.

⁸ Speech on October 15, 1957, cited by Witkin, 6.

⁹ Memcon, October 8, 1957, 5:00 p.m., box 27, DDE Diary series, Ann Whitman file, DDEL, 1.

to "Play down competitive aspects and implication of a 'race'. . . Keep the accomplishment within a peaceful context, stressing the usefulness of the experiment towards increasing knowledge. . . . Avoid any material indicating that this demonstrates Soviet superiority in science and material indicating that this strengthens the Soviet hand in dealing with the West."¹⁰ The next day in his press conference, Eisenhower struck the same chord: "I think I have time and again emphasized my concern about the nation's security. . . . Now, as far as the satellite is concerned, that does not raise my apprehensions, not one iota. I see nothing at this moment, at this stage of development, that is significant in that development as far as security is concerned. . . ." Eisenhower inadvertently let slip the real motivating factor of his overall space policy when he said that the Russians, even with their fine scientists and dictatorial society ". . . have put one small ball in the air. I wouldn't believe that at this moment you have to fear the intelligence aspects of this."¹¹

The Eisenhower administration was perfectly willing to admit Sputnik's launching indicated an level of Soviet competence in ICBMs that was unexpectedly advanced, but also felt this was nothing to panic about. Quarles flatly stated Sputnik's primary implication was that the "Soviets possess a competence in long-range rocketry and in auxiliary fields which is even more advanced than the competence with which we had credited them; although, of course, we had always given them the capability of orbiting an earth satellite."¹² Eisenhower responded to the panic-mongering of Congressional Democrats such as Stuart Symington by stating, "In total military strength, the US. in our judgment, is still distinctly ahead of the USSR. . . ."¹³ and that ". . . the possibility of the Russians having intercontinental missiles

¹⁰ Memorandum of Meeting, OCB, Working Group on Certain Aspects of NSC 5520, folder: OCB Working Group on Earth Satellites, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC, 2.

¹¹ Presidential news conference, October 9, 1957, *Public Papers of the Presidents, 1957* (Washington, DC: USGPO, 1958), 730, 724.

¹² Memorandum of Discussion, Subject: Discussion at the 339th Meeting of the National Security Council, October 10, 1957, October 11, 1957, folder: 339th Meeting of the NSC, box 9, NSC Series, Ann Whitman File, DDEL, 4.

¹³ Eisenhower letter to Symington, October 29, 1957, folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC, 1.

before we do was not catastrophic since that by no means removed the power of our bombers.”¹⁴ James R. Killian, soon to be named Eisenhower’s first Special Assistant for Science and Technology, summarized Eisenhower’s general demeanor:

I think that Eisenhower was in no way upset about the Russian achievement. that I think he knew enough about our military strength to have no doubts that we were still in a position of superiority at that time. I think too that he felt the public had overreacted to the event, and that his problem was more a political problem than it was one of dealing actually with a major weakness in our government or in its policies.

I think a number of us also took the view that it was silly to conclude from the Russian’s launch of Sputnik that all of our scientific programs both within and without government had been brought into serious question, or that it meant any really significant weakness. . .¹⁵

Killian has written about Eisenhower’s general approach to the panic following Sputnik, saying Eisenhower called him one morning out of the blue. “He wanted me to know, he said, that his own judgment led him to the conclusion that we would not be involved in any hostilities with the Soviets during the oncoming five years and that the Soviets were not as strong as many claimed.”¹⁶

Eisenhower was not unconcerned, however. The confirmation of Soviet ICBM abilities topped administration worries, not the Soviet space accomplishment because the latter, said one high administration official “. . . was regarded as a stunt more than a gigantic event of worldwide crucial significance. . . . I think the ‘sophisticates’ regarded it more as a stunt for worldwide publicity purposes by the Soviet Union rather than as a matter of grave significance. The gravity was regarded as what they would do with their weaponry, not what they were doing with Sputnik.”¹⁷ Eisenhower’s point man on space up to this point, Donald Quarles, concurred and wrote Eisenhower three days after Sputnik that the facts “. . . appear to be that the satellite success does indicate competence in long-range ballistic missiles and does tend to cor-

¹⁴ Minutes of Cabinet Meeting, January 3, 1958, folder: Jan 1958 Staff Notes, box 30, DDE Diary Series, Ann Whitman File, DDEL.

¹⁵ Oral history interview of James R. Killian, November 9, 1969 through July 17, 1970, DDEL, 42, 44.

¹⁶ James R. Killian, Jr., *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology*. Cambridge, MA: The MIT Press, 1977, 222.

¹⁷ Bryce Harlow, Deputy Assistant to the President for Congressional Affairs, oral history interview of, June 11, 1974, folder: Bryce Harlow interview, box: White House, Presidents, Eisenhower (cont.), DOD/CIA Information, Eisenhower, John S.D. - Lodge H.C., NHDRC, 18.

roborate their ICBM claim of August 27."¹⁸ Killian simply said Sputnik "... ominously suggested a capacity to lift a nuclear bomb into the upper atmosphere and send it hurtling down upon its target of choice."¹⁹ This fact was apparently not lost on the Democrats, as an aide to Senate Majority Leader Lyndon B. Johnson remarked, "You know, it's not the satellite that is so significant today. It's what put it there."²⁰ Another Johnson staffer explained, "The simple fact is that we can no longer consider the Russians to be behind us in technology. It took them four years to catch up to our atomic bomb and nine months to catch up to our hydrogen bomb. Now we are trying to catch up to their satellite."²¹

The Soviets wasted no time feeding the growing concern. Nikita Khrushchev stated three days after Sputnik, "We now have all the rockets we need: long-range rockets, intermediate-range rockets and short-range rockets." After the USSR launched Sputnik II on November 3, 1957 (carrying a live dog, clearly a precursor to human spaceflight) he declared, "I think that it is no secret that there now exists a range of missiles with the aid of which it is possible to fulfill any assignment of operational and strategic importance. . . . The Soviet Union has intercontinental ballistic rockets with hydrogen warheads [which] now make it possible to hit a target in any area of the globe."²² Khrushchev even challenged the United States to a rocket "shooting match" to prove his assertions that the Soviets were ahead.²³

¹⁸ Donald Quarles. Memorandum for the President. Subject: Earth Satellite. October 7, 1957, folder: Earth Satellites (1), box 7, Briefing Notes subseries, NSC Series, Office of the Special Assistant for National Security Affairs: Records, 1952-61, White House Office, DDEL, 7. On August 27, 1957 the Soviets had claimed to have successfully test launched an ICBM but this was still considered an open question until Sputnik.

¹⁹ Killian, *Sputnik, Scientists, and Eisenhower*, 3.

²⁰ Oral history interview of Gerald Siegel, June 8, 1976, box: Emme/Roland interviews on early NASA history, shelf V-A-1, NHDRC, 10.

²¹ George Reedy, cited in William Burrows, *Deep Black: Space Espionage and National Security* (New York: Berkley Books, 1986), 89.

²² Cited in Arnold L. Horelick and Myron Rush, *Strategic Power and Soviet Foreign Policy* (Chicago: University of Chicago Press, 1966), 43, 45.

²³ A citation of a November 16, 1957 *New York Times* interview of Khrushchev, reprinted in *Chronology of Significant Events and Decisions Relating to the U.S. Missile and Earth Satellite Development Programs, Supplement I, October 1957 through October 1958* (Historical Division, Joint Secretariat, Joint Chiefs of Staff, DoD), December 15, 1958, 6.

The interconnected concerns, justified or not, with Soviet missiles, Soviet space capabilities, Soviet science and technology, and the Soviet system in general all outpacing America led to a sense of panic that eventually impelled Eisenhower to create NASA. He did not subscribe to the thesis that America was threatened by this constellation of new issues Sputnik raised, but the call for action was severe enough so that something had to be done, and NASA's creation was one of the steps Eisenhower approved.²⁴ Numerous individuals intimately involved with the American side of the Sputnik equation have testified to the sense of alarm and even panic that pervaded Washington in the fall of 1957 and spring of 1958. Lyndon Johnson remembered a "... profound shock of realizing that it might be possible for another nation to achieve technological superiority over this great country of ours. Most Americans shared my sense of shock that October night. . . . [Sputnik] plunged the America of 1957 into spiritual depression [and] depreciated our prestige. Russia's image as a technological leader suddenly increased to alarming proportions and our own image diminished, especially among the people of the developing nations."²⁵ One congressman, also a historian, summarized, "The prairie fire of demands for action swept across the Nation. The clamor rose to a roar."²⁶

Lest this be thought partisan posturing, Killian also sensed a "climate of near hysteria" among many people, "some of whom should have known better." His conclusion was that Sputnik did indeed create "... a crisis of confidence that swept the country like a windblown forest fire. Overnight there developed a widespread fear that the country lay at the mercy of the Russian military machine and that our

²⁴ Entire books can, and have, been written on other facets of Eisenhower's other responses to Sputnik such as the Defense Reorganization Act strengthening the powers of the Secretary of Defense, or the National Defense Education Act which for the first time put the federal government in the business of rendering financial assistance to colleges and universities. See Robert Divine, *The Sputnik Challenge*. (New York and Oxford: Oxford University Press, 1993) for an overview and individual monographs such as Barbara Barksdale Clowse, *Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958* (Westport, CT: Greenwood Press, 1981) for the individual responses. This dissertation must limit its focus to issues directly relevant to the NASA-DoD relationship.

²⁵ Lyndon B. Johnson, *The Vantage Point: Perspectives on the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), 271, 273.

²⁶ Ken Hechler, *The Endless Space Frontier: A History of the House Committee on Science and Astronautics, 1959-1978*, America Astronautical Society History Series, Vol. 4 (San Diego, CA: Univelt, Inc., 1982), 2.

own government and its military arm had abruptly lost the power to defend the homeland itself. . . ."²⁷ Noted physicist and political conservative Edward Teller, known as "the father of the atomic bomb," declared the United States had lost "a battle more important and greater than Pearl Harbor."²⁸ The *Washington Post*'s tone represented that taken by the major media outlets:

Not even the most dim-witted State Department official needed more than a second glance at those news bulletins on Sputnik to realize that the United States had suffered the worst psychological licking in the history of its relations and struggle with the Soviet Union and the Communist World. The United States could no longer proclaim the supremacy of its industrial machine or of the capitalist free system of economics.²⁹

When NASA's first and Eisenhower's only NASA Administrator, T. Keith Glennan, looked back on NASA's creation, he commented, "I think you ought to realize first that NASA was born out of a state of hysteria; that, indeed, if Sputnik number one had not been put into orbit, it is highly improbable that there would be a NASA."³⁰ Eisenhower himself concurred, later saying NASA's "whole program was based on psychological values. . . . the furor produced by Sputnik was really the reason for the creation of NASA."³¹ Eisenhower did not *like* the fact that he had to react to a psychological panic. His son recalled, "I think the public became hysterical, and he couldn't figure out why they were," which caused his father to wonder, "What the hell are they (the public) worried about?"³² Eisenhower expressed his consterna-

²⁷ Killian, *Sputnik, Scientists, and Eisenhower*, xv, 7.

²⁸ *Ibid.*, 8.

²⁹ *Washington Post*, October 20, 1957, as cited in Ralph Lapp of the Advisory Committee on Science and Technology of the Democratic Advisory Council, "Position Paper on Space Research," prepared for Senator John F. Kennedy, September 7, 1960, papers of the Historian, NHDRC. It remains an open question, with conflicting evidence such a surveys of public opinion on both sides, as to whether the media and Congress through their overreactions caused the people to panic or whether the panic sprang from the grass roots and spread to the leadership level and was simply reported by the media. This importance for this study is that there *was* a growing sense of alarm that soon crescendoed to a point where Eisenhower had to make some response.

³⁰ T. Keith Glennan, speech to the Industrial College of the Armed Forces, November 20, 1959, folder: Glennan Speeches and Congressional statements, Glennan subseries, Administrators series, NHDRC, 1.

³¹ Memorandum of Discussion at the 415th meeting of the NSC, July 30, 1959, folder: 415th Meeting of the NSC, box 11, NSC series, Ann Whitman file, DDEL, 7-8.

³² John S. D. Eisenhower, oral history interview of, February 28, 1967, DDEL, 94-95.

tion more judiciously in his memoirs. "This was a period of anxiety. Sputnik had revealed the psychological vulnerability of our people The Soviet satellites were a genuine technological triumph, but this was exceeded by their propaganda value." Eisenhower thus believed his challenge was ". . . to find way of affording perspective to our people and so relieve the wave of near-hysteria."³³

Eisenhower Forged a Response

The pattern of response that emerged as Eisenhower tried to calm the United States highlighted his emphases on the pillars of his space policy: space exploration was not to be regarded as a prestige-oriented race with the Soviet Union; space exploration had to be integrated into a balanced program of federal expenditures lest the 'Great Equation' be upset; space exploration must not endanger in any way the process of opening up the Soviet Union by means of gathering intelligence via reconnaissance satellites. The balancing of these three trends resulting in the creation of NASA.

The Right of Overflight

The last of these three items is easiest to present. Quarles concluded that since no countries, the United States included, protested Sputnik's transit over them, this meant the legal principle of freedom of overflight for reconnaissance satellites was therefore established.³⁴ In an October 8, 1957 conference with the President, Quarles explained, ". . . that the Russians have in fact done us a good turn, unintentionally, in establishing the concept of freedom of international space - this seems to be generally accepted as orbital space, in which the missile [Sputnik] is making an inoffensive passage."³⁵ Another version of this meeting elaborates, "Quarles made the important point that the Russians having been the first with their Satellite to overfly *all* countries, they have thereby established the international characteristic of orbital space. We believe we can get a great deal more information out of free use of orbital space than they

³³ Eisenhower, *Waging Peace*, 226, 211.

³⁴ This assumption would turn out to be incorrect, as demonstrated by the Soviets continuing diplomatic protests against reconnaissance satellites throughout the Kennedy administration; this will be touched upon in chapters 6 and 7.

³⁵ Memorandum of Conference with the President, October 8, 1957, 8:30 a.m., dated October 9, 1957, folder: October 1957 Staff Notes (2), box 27, DDE Diary Series, Ann Whitman file, DDEL, 2.

can."³⁶ Quarles explained to a full NSC meeting two days later that one of the United States objectives in the Vanguard program ". . . was to establish the principle of the freedom of outer space - that is, the international rather than the national character of outer space. In this respect the Soviets have now proved very helpful. Their earth satellite has overflown practically every nation on earth, and there have thus far been no protests. . . . the outer space implications of the launching of this satellite were of very great significance, especially in relation to the development of reconnaissance satellites." In response to a question from Nixon on whether the United States still planned to make information from Vanguard available to all, Quarles responded in the affirmative, leading Nixon to agree that this ". . . would be a great propaganda advantage for the United States to give out such information." Eisenhower concluded the meeting by stating, "We should answer inquiries by stating that we have a plan - a good plan - and that we are going to stick to it."³⁷ To the full Cabinet on October 18, 1957, Quarles explained the United States IGY satellite program ". . . had been separated from the military programs so as to keep it purely scientific and thus perhaps obviate or weaken Soviet protests on over-flights. Ironically, the Russians themselves . . . had now established the acceptability of over-flights."³⁸

This supposed-international consensus concerning the rights of satellite overflight was of primary importance to the administration and had to be protected. Thus the "space for peace" policy that was so widely publicized. Eisenhower's space and civilian defense officials wanted the American space program to appear as peaceful, scientific, and civilian as possible so as to avoid provoking the Soviets and possibly endangering the right of overflight. This space for peace policy was the primary cause of tension between space-oriented Air Force officers and civilian executive branch leaders, OSD included, for the next several years, until at least the mid-1960s. The Air Force wanted to explore the possibilities for fully using space for national defense. Both the Eisenhower and Kennedy administrations largely quashed this so as to

³⁶ Minutes of Meeting with the President, October 8, 1957, reprinted in Glennon, John P., Editor in Chief, *Foreign Relations of the United States, 1955-1957, Volume XI, United Nations and General International Matters* (Washington, DC: USGPO, 1988), 755-56. Emphasis in original.

³⁷ Memorandum of Discussion, 339th Meeting of the NSC, *supra*, 4-6.

³⁸ Minutes of Cabinet Meeting of October 18, 1957, folder: Cabinet Meeting of October 18, 1957, box 9, Cabinet series, Ann Whitman file, DDEL, 2-3.

protect the vital reconnaissance satellites. One early example of this is a briefing the Air Force gave Quarles on October 16, 1957 on the progress of its WS-117L reconnaissance satellite: "Mr. Quarles took very strong and specific exception to the inclusion in the presentation of any thoughts on the use of a satellite as a (nuclear) weapons carrier and stated that the Air Force was out of line in advancing this as a possible application of the satellite. He verbally directed that any such applications not be considered further in Air Force planning." Air Force leaders objected but "Mr. Quarles remained adamant."³⁹ The Air Force would find itself similarly chastised time and time again over the next several years.

No Race for Prestige

The second tenet of Eisenhower's space policy in evidence after Sputnik in the period leading up to NASA's creation was his desire to avoid a race for prestige, a crash program of spectaculars. When Press Secretary James Hagerty had to brief the press the day after Sputnik one of the points he emphasized was, "I would also like to make it quite clear that the Soviet launching did not come as any surprise and that we have never thought of our program as one which was in a race with the Soviet program."⁴⁰ At one of the October 8, 1957 meetings Quarles made clear, "There is no doubt that the Redstone, had it been used, could have orbited a satellite a year or more ago" but Eisenhower interjected, "... timing was never given too much importance in our own program, which is tied to the IGY. . . ."⁴¹ He emphasized, "No pressure or priority was exerted by the U.S. on timing, so long as the Satellite would be orbited during the IGY 1957-1958."⁴²

Such declarations can only lead the historian to conclude that Eisenhower ignored the clear statements that NSC 5520 contained concerning the potential psychological impact of the Soviets

³⁹ Colonel F.C.E. Oder, USAF, Director, WS-117L. Memorandum for Record, Briefing of Deputy Secretary of Defense Mr. Quarles on WS 117L on 16 October 1957, dated 25 October 1957. Quoted in Peter L. Hayes, *Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War*, Ph.D. dissertation (Fletcher School of Law and Diplomacy, Tufts University, 1994), 114.

⁴⁰ James C. Hagerty, transcript of press conference, October 5, 1957, James C. Hagerty papers, DDEL, on file in the personal papers of the Historian, NHDRC, 2.

⁴¹ Memorandum of Conference with the President, October 8, 1957, 8:30 p.m., supra, 1.

⁴² NSC, Conference in the President's Office, 8:30 a.m., October 8, 1957, folder: Earth Satellites (1), box 7, Briefing Notes subseries, NSC series, OSANSA: Records, White House Office, DDEL, 1.

launching a satellite first. In addition, he was not swayed by the NSC/OCB's entreaties to incorporate an awareness of the prestige ramifications into the Vanguard schedule. The words are present in the pre-Sputnik policy documents, but a presidential commitment was lacking. Eisenhower so much as admitted this in a press conference of October 9, 1957. He was describing the history of the Vanguard program and said, "... more than once we would say, well, there is going to be a great psychological advantage in world politics to putting this thing up. But that didn't seem to be a reason, in view of the scientific character of our development, there didn't seem to be a reason for just trying to grow hysterical about it." The written statement distributed to the press stated, "Our satellite program has never been conducted as a race with other nations."⁴³ Concerning human spaceflight after NASA's creation, much the same pattern would hold.

That same day Eisenhower swore in a new Secretary of Defense, Neil McElroy. At a conference with him, Eisenhower, Quarles, the civilian service secretaries and the JCS, Eisenhower expressed his displeasure: "When military people begin to talk about this matter, and to assert that other missiles could have been used to launch a satellite sooner, they tend to make the matter look like a 'race,' which is exactly the wrong impression."⁴⁴ By the first week of 1958, Eisenhower was almost philosophical: "It seemed ironic... that we should undertake something in good faith only to get behind the eight-ball in a contest which we never considered a contest." He added, a bit disingenuously given the prestige-related sections of NSC 5520 and the OCB's pre-Sputnik meetings, "Only very recently has this psychological factor of beating the Russians to it been introduced."⁴⁵

Even after Eisenhower had signed the bill establishing NASA he sent NASA's Deputy Administrator Hugh Dryden to Congress to explain NASA's first year budget: "It most decidedly is not a crash

⁴³ Eisenhower, press conference, October 9, 1957, *Public Papers of the President, 1957*, 728, 735.

⁴⁴ Memorandum of Conference with the President, October 9, 1957, folder: Missiles and Satellites, Vol. 1 (3), box 6, Department of Defense subseries, Subject Series, Office of the Staff Secretary: Records, DDEL, 1.

⁴⁵ L. A. Minnich, Supplementary Notes, Legislative Leadership meeting, January 7, 1958, folder: January 1958 Staff Notes, box 30, DDE Diary Series, Ann Whitman file, DDEL, 1-2.

program to catch up with anybody." Congressman Overton Brooks asked if this meant NASA's program was not in any way competitive with the Soviet program, to which Dryden replied, "I would say that this program is not at a level at which we could guarantee to do that."⁴⁶ After leaving the White House, Eisenhower explained to a historian:

Under no circumstances did we want to make the thing a competition, because a race always implies urgency and special progress regardless of cost or need. . . . Neither then nor since have I ever agreed that it was wise to base any of these projects on an openly and announced competition with any country. This kind of thing is unnecessary, wasteful and violates the basic tenets of common sense.⁴⁷

Closely related, of course, was Eisenhower's immediate post-Sputnik lack of enthusiasm for prestige-oriented space spectacles, or "stunts." Quarles testified to Congress on November 18, 1957: "We must not be panicked or pushed into any sudden dispersion of effort. . . . We must not be talked into 'hitting the moon with a rocket,' for example, just to be first, unless by doing so we stand to gain something of real scientific or military significance."⁴⁸ Before endorsing the creation of a civilian organization to conduct the civilian space program, Eisenhower certainly had to accept to a small degree the legitimacy of the prestige factor (though as will be seen later, this didn't transfer into his ideas concerning human spaceflight) or it would be difficult to justify NASA. On February 4, 1958, "The President stressed the importance of picking out the phases of activity in which we should undertake to compete with the Soviets, and to beat them. We should not try to excel in everything. He added that psychological as well as technical considerations are important - at times appearances are as significant as the reality, if not more so."⁴⁹ The shift in Eisenhower's thinking was away from a seemingly blanket lack of enthusiasm for prestige-oriented projects to an attitude in which some carefully selected projects could be designed to compete with the Soviets (but human spaceflight would not be one of them).

⁴⁶ Cited in Hechler, 11.

⁴⁷ Eisenhower letter to Professor Loyd Swenson, August 5, 1965, primary author of *This New Ocean*, the history of Project Mercury, NHDRC, 4.

⁴⁸ Congress, Senate, Committee on Armed Services, Preparedness Investigating Subcommittee, *Inquiry into Satellite and Missile Programs (ISMP)*, 85th Congress, 1st and 2nd Sessions, 1958, 302.

⁴⁹ Memcon, February 4, 1958, folder: Staff Notes February 1958, box 30, DDE Diary series, Ann Whitman file, DDEL, 2.

By way of example, Eisenhower approved a 100 foot wide balloon for orbit as a passive (reflective) communications satellite because, according to his President's Science Advisory Committee (PSAC) it "appears to be the best psychological-scientific experiment" of the options available because of its "psychological value from the standpoint of free use for every nation."⁵⁰ Similarly, in December 1958 he authorized Project SCORE (Signal Communication Orbit Relay Experiment). This was a stripped down Atlas booster weighting 9,000 pounds plus 100 pounds of communications equipment with the tape recorded message from Eisenhower, "I convey to you and to all mankind America's wish for peace on earth and good will toward men everywhere."⁵¹ It broadcast for eight days and the United States could boast it had orbited a "satellite" of over four tons, even though most of it was simply an expended missile's carcass. Said one historian, "Technically, it was all a stunt."⁵² DDR&E Herbert York concurred, "It was propaganda from the very beginning, and I was opposed to a propagandistic approach. I felt it's hollow and people are going to know it's hollow."⁵³

Therefore, while Eisenhower had a general antipathy toward competing with the Soviet Union, he did occasionally feel such competitions were necessary. As Eisenhower's Staff Secretary and DoD liaison summarized, "The President's approach was if we're doing the right thing in about the right way we'll let the prestige work itself out."⁵⁴ In February 1958, shortly after America orbited its first satellite, Eisenhower resisted calls for a crash lunar probe program because he would rather have a good IRBM "than be able to hit the moon, for we didn't have any enemies on the moon!"⁵⁵ DDR&E York explained,

⁵⁰ Memorandum, Robert O. Piland, PSAC, to James Killian, June 25, 1958, SPI document 1120, p. 1.

⁵¹ *Public Papers of the Presidents, 1958*, 865.

⁵² Roland J. Barber Associates, *The Advanced Research Projects Agency, 1958-1974*, DOD Contract No. MDA 903-74-C-0096, 1975, 24.

⁵³ Herbert York, oral history interview of, June 12, 1973, Herbert York file, Biographical series, NHDRC, 94.

⁵⁴ Andrew J. Goodpaster, oral history interview of, July 22, 1974, folder: Goodpaster interview, box: White House, Presidents, Eisenhower, DOD/CIA Information, NHDRC, 56.

⁵⁵ Cited in Stephen E. Ambrose, *Eisenhower: Volume Two, The President* (New York: Simon and Schuster, 1984), 457.

"Eisenhower, Killian and Kistiakowsky [George, Killian's successor as Eisenhower's science adviser] were not the kind of people who would accept prestige as the sole reason for doing something. . . With them I think it's fair to say prestige could be a fine dividend but there had to be a better reason than simply prestige alone."⁵⁶

The Great Equation Continued

The third and final philosophical precursor for NASA's creation was Eisenhower's sense of balance embodied in the Great Equation, defined in the previous chapter. He wrote an executive of the National Planning Association that

whatever means the free world, and more particularly our Nation, take to combat and defeat the Soviet effort must be designed for indefinite use and endurance. Hasty and extraordinary effort under the impetus of sudden fear. . . cannot provide for the West an adequate answer to the threat. We must decide upon programs based upon all the pertinent factors in the problem; we must be prepared to sustain the programs for years, even decades. . . . We face, not a temporary emergency, such as a war, but a long term responsibility. . . . Should we have to resort to anything resembling a garrison state, then all that we are striving to defend would be weakened. . .⁵⁷

Eisenhower's standard lecture to his staff during this period stated, "If the budget is too high, inflation occurs, which in effect cuts down the value of the dollar so that nothing is gained and the process is self-defeating a point is reached at which the additions to military strengths resulting from additional funds diminish very rapidly."⁵⁸ This struggle to limit federal expenditures in the face of post-Sputnik calls for massive increases in defense and space spending may have been Eisenhower's greatest struggle during his second term. His personal secretary, Ann Whitman, wrote in her diary for November 22, 1957 that the President had had "just about the worst day ever - with two very tough meetings full of doom and gloom" which were a real "mess of pottage."⁵⁹ As a DoD official recalled, "No sooner had Sputnik's first

⁵⁶ Herbert York, oral history interview of, January 24, 1989, National Air and Space Museum (NASM), 46-47.

⁵⁷ Eisenhower letter to Robert Altschul, National Planning Association, October 25, 1957, folder: October 1957 D.D.E Dictation, box 27, DDE Diary Series, Ann Whitman file, DDEL, 2-4.

⁵⁸ Memcon, October 30, 1957, dated October 31, 1957, folder: October 1957 Staff Notes (1), box 27, DDE Diary Series, Ann Whitman file, DDEL, 2.

⁵⁹ Ann Whitman diary entry for November 22, 1957, folder: November '57 A.C.W. DIARY (1), box 9, Administration series, Ann Whitman File, DDEL, 1.

beep been heard - via the press - than the nation's legislators leaped forward like heavy drinkers hearing a cork pop."⁶⁰

Limiting federal expenditures, even in the post-Sputnik panic, also applied to space exploration proposals. After a November 1, 1957 cabinet meeting during which Eisenhower was bombarded with new space-related spending proposals, he exploded, "Look, I'd like to know what's on the other side of the moon, but I won't pay to find out this year!"⁶¹ Even when Eisenhower began seriously thinking about how to structure the space program in the spring of 1958, and accepted the idea that the NACA would serve as the nucleus for the NASA, and what budget level would be required, the discussion focused on a figure of \$300 million for FY59, climbing to \$625 million in FY65. In reality, after Kennedy's decision to go to the moon, NASA's budget in FY65 was almost ten times this figure, at \$5.138 billion.⁶² In July 1958 as the NASA budget was firming up, Eisenhower "... doubted whether it would be wise to give too much additional money to the agency - he thought we should provide enough for organization, plans, and the initial projects transferred from Defense. . . . It would not have to be too big for the first year."⁶³ At a news conference on April 16, 1958 Eisenhower was asked what antirecession and public works expenditures he supported. He replied, "Let's try to be reasonable. Let's try to use some common sense and not just get a Sputnik attitude about everything."⁶⁴ Eisenhower's drive to limit overall federal expenditures so as not to endanger the American economy is a clearly continuous trend in his space policy before Sputnik, during the response to Sputnik, and in the NASA era as well, thereby braking any rush toward human spaceflight.

⁶⁰ Oliver M. Gale, "Post-Sputnik Washington from an Inside Office," *Cincinnati Historical Society Bulletin* 31 (1973): 226.

⁶¹ Cited by Ambrose, 433.

⁶² NASA, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities* (Washington, DC: USGPO, 1996), A-30.

⁶³ Memcon, July 17, 1958, dated July 18, 1958, folder: Staff Memos - July 1958 (1), box 35, DDE Diary series, Ann Whitman files, DDEL, 1.

⁶⁴ Eisenhower, News Conference, April 16, 1958, *Public Papers of the Presidents, 1958* (Washington, DC: USGPO, 1959), 314.

Eisenhower tried to tie all the elements of his personal philosophy together in an speech on November 7, 1957 he called his "chins up" speech. It was designed to calm what he had come to accept was a growing sense of alarm sweeping America after Sputnik that America's national security and way of life were suddenly imperiled by a vastly superior USSR which had surpassed the United States in science and technology. An important point to remember relevant to Eisenhower's attempt to calm the United States was that he had access to U-2 photographs which made it clear that claims of a large Soviet ICBM force menacing America were highly unlikely. However, Eisenhower could not reveal this reason for his confidence because to do so would risk comprising the U-2 and the vital information it, and only it, could obtain.⁶⁵

On November 7 Eisenhower emphasized America's security posture was "one of great strength Our nation has today, and has had for some years, enough power in its strategic retaliatory forces to bring near annihilation to the war-making capabilities of any other country" through its hundreds of bombers and a diversified family of missiles "adapted to every kind of distance, launching and use." He explained, "Our scientists assure me that we are well ahead of the Soviets in the nuclear field, both in quantity and in quality. We intend to stay ahead." He then turned to space: "Earth satellites, in themselves, have no direct present effect upon the nation's security" though they do imply the Soviet Union has powerful missiles.⁶⁶ That was, however, all Eisenhower said concerning space, satellites, or Sputnik, except to close by saying, "What the world needs today even more than a giant leap into outer space, is a giant leap toward peace."⁶⁷ The majority of is speech directly addressed America's national defense structure and Eisenhower's assessment that it was entirely adequate. This indicates again how Eisen-

⁶⁵ Indeed, the U-2 had been tracked by Soviet radar since its maiden journey in mid-1956. One would eventually be shot down in May 1960, causing immense embarrassment to the administration. The best complete account of the U-2 is Michael Beschloss, *Mayday: Eisenhower, Khrushchev and the U-2 Affair* (New York: Harper & Row, 1986).

⁶⁶ Eisenhower, Radio and Television Address to the American People on Science in National Security, November 7, 1957, *Public Papers of the Presidents, 1957* (Washington, DC: USGPO, 1958), 789ff.

⁶⁷ *Ibid.*, 798.

hower, immediately after Sputnik and until the spring of 1958, perceived space an issue primarily related to the national defense and not to international, prestige- or propaganda-oriented questions.

Eisenhower elaborated in his second "chins up" speech a week later, November 13, 1957: "The sputniks have inspired a wide variety of suggestions. These range from acceleration of missile programs, to shooting a rocket around the moon, to an indiscriminate increase in every kind of military and scientific expenditure. Now, my friends, common sense demands that we put first things first. The first of all firsts is our nation's security!" He explained that if a satellite was solely for scientific purposes then its size and cost must be tailored to the scientific job it was going to do. If it was for defense purposes, "its urgency for this purpose is to be judged in comparison with the probable value of competing defense projects."⁶⁸

In the November 7, 1957 address Eisenhower announced his first concrete response to Sputnik: the appointment of Killian (who had so impressed Eisenhower with his management of the TCP tasking) to serve as the first Special Assistant to the President for Science and Technology. The President tasked him with coordinating federal policy concerning scientific R&D and technology, including space policy. From this point forward Killian, and the scientists who collectively formed the PSAC, which Eisenhower elevated to be a White House organization, would play the central role in creating NASA. Eisenhower also created a Guided Missile Director within the DoD to tackle the rampant interservice rivalry in ballistic missiles. He also eventually authorized the first federal funding for colleges and universities, designed to increase the production of scientists and engineers. Finally, Eisenhower did increase defense spending as a result of Sputnik: a \$1.3 billion supplemental for FY58 brought the total to \$44.5 billion and a further increase brought FY59's defense budget to \$46.6 billion. Most of these additional funds were for strategic bombers and ballistic missiles. Nevertheless, once the furor over Sputnik faded, Eisenhower decreased the DoD's budget to \$45.9 billion for FY60, the lowest figure since FY54, when he assumed office. From the time of Sputnik's launch until the FY60 Pentagon budget, defense spending decreased from 9.9 percent of GNP to 9.1 percent.⁶⁹ In no way can any of Eisenhower's post-Sputnik actions be

⁶⁸ Eisenhower, Radio and Television Address to the America People, Our Future Security, *ibid.*, 811-12.

⁶⁹ John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy* (Oxford and New York: Oxford University Press, 1982), 185; and Douglas

considered rash or precipitous. Eisenhower said that in responding to Sputnik, "... somehow the United States had to put on hair shirt and sackcloth yet avoid scaring people."⁷⁰

PSAC and Civil Space

The central event for this study in the post-Sputnik responses is the civil-military factor as it impacted NASA's creation. Perhaps the key factor was the central role played by Killian and PSAC. These scientists firmly believed a civilian organization should conduct the space exploration program.⁷¹ Once Eisenhower tasked Killian with determining how America should structure its space program, it comes as no great surprise that the eventual recommendation was to greatly expand the existing NACA into a NASA, while preserving the DoD's right to weapons systems related space activities. Quite simply, Killian "... exerted enormous influence on the manner in which the American space program was structured and conducted."⁷²

Killian recounts, "I was greatly helped in achieving admission to the inner sanctum of the Eisenhower White House by several earlier appointments" such as the TCP and serving as chairman of the President's Board of Consultants on Foreign Intelligence Activities.⁷³ His authority from Eisenhower was nebulous but significant. He was to "... have the active responsibility of helping me [Eisenhower] follow

Kinnard, *President Eisenhower and Strategy Management: A Study in Defense Politics* (Lexington, KY: University Press of Kentucky, 1977), 69.

⁷⁰ Minutes of Cabinet Meeting, January 3, 1958, *supra*, 3.

⁷¹ The PSAC files in the Eisenhower Library make clear the prevalence of this attitude among PSAC members. For a complete list of PSAC members during Killian's tenure see his memoirs, *Sputnik, Scientists, and Eisenhower*, Appendix 2, 277-279. PSAC included scientific luminaries from both academia and industry such as: William O. Baker, Vice President of Bell Telephone Laboratories; Lloyd V. Berkner of the National Academy of Sciences; Detlev W. Bronk, Chairman of the National Science Foundation; NACA Chairman and Vice President of Shell Oil James H. Doolittle; NACA Director Dryden; George B. Kistiakowsky, Harvard chemistry professor and Killian's replacement in 1959; Edwin H. Land, President of the Polaroid Corporation; Edward M. Purcell, Harvard physics professor and Nobel Prize winner; Alan T. Waterman, Director of the NSF; and Jerome B. Wiesner, Director of MIT's Research Laboratory of Electronics who would also serve as Kennedy's science adviser.

⁷² R. Cargill Hall, "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security," *Prologue: Quarterly Journal of the National Archives and Record Administration* 27 (Spring 1995): 65.

⁷³ James R. Killian, Jr., *The Education of a College President* (Cambridge, MA: The MIT Press, 1985), 326-27.

through on the program of scientific improvement of our defenses [so that the] entire program is carried forward in closely integrated fashion, and that such things as interservice competition or insufficient use of overtime shall not be allowed to create even the suspicion of harm to our scientific and development program." Eisenhower empowered Killian to "see to it that those projects which experts judge have the highest potential shall advance with the utmost speed. . . . it is my full desire that you have full access to all plans, programs, and activities involving science and technology in the Government, including the Department of Defense, AEC [Atomic Energy Commission], and CIA."⁷⁴

When Killian left full-time government service in July 1959, Eisenhower praised his work and credited it with helping the United States avoid the urge ". . . to plunge headfirst and almost blindly into the space age. . . . No one did more than you, in those early days, to bring reason, fact, and logic into our plans for space research and adventure."⁷⁵ Jerome Wiesner would become Kennedy's science adviser and was a PSAC member in the Eisenhower administration. He corroborated the highly influential role Killian and other scientists occupied, saying Killian was always "extremely careful about what he does and says." As a result, "I think the President understood that and appreciated it so that on the whole he trusted him completely; and really, I had the impression he was very supported by having Killian around."⁷⁶ Killian's appointment was the first time that a scientist had key access to the White House and one scholar called it ". . . the most important step that Eisenhower took following Sputnik II."⁷⁷

The esteem in which Eisenhower held Killian seems also to have been true for the PSAC and its members as a whole. In fact, key PSAC members were one of the first groups Eisenhower convened after Sputnik. After their October 15, 1957 meeting, "The President concluded by saying that he was delighted

⁷⁴ Killian, *Sputnik, Scientists, and Eisenhower*, 28, 36.

⁷⁵ Eisenhower letter to Killian, July 16, 1959, *President Dwight D. Eisenhower's Office Files, 1953-1961, Part 1: Eisenhower Administration Series*, microfilmed from the Dwight D. Eisenhower Library. Project Coordinator Robert E. Lester, part of the series *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William E. Leuchtenburg, General Editor (Bethesda, Maryland: University Publications of America, 1990), reel 19.

⁷⁶ Oral history interview of Jerome Wiesner, July 24, 1974, Wiesner file, Biographical series, NHDRC, 23.

⁷⁷ Divine, *The Sputnik Challenge*, 47.

with this conversation. . . . He found no solace in crying over spilled milk. He was not concerned about the Soviets beating us in the Satellite field."⁷⁸ The scientists had confirmed Eisenhower's fundamental beliefs that while the Soviet Sputnik was a noteworthy scientific accomplishment, it did not imperil United States national security. The scientists did not recommend any crash federal programs but rather supported the appointment of an individual within the White House to coordinate scientific affairs: this was the genesis of the November 7 Killian appointment. Finally, the scientists supported the idea of several presidential speeches to calm the public, a recommendation Eisenhower acted upon on November 7 and 13, 1957. One analysis showed in the two weeks after Sputnik Eisenhower met with more scientists than he had in the previous ten months.⁷⁹

Eisenhower's trust of what he later termed "my scientists" grew throughout the remainder of his administration. Shortly before Eisenhower died Killian visited him and Ike volunteered, "You know, Jim, this bunch of scientists was one of the few groups that I encountered in Washington who seemed to be there to help the country and not help themselves."⁸⁰ In fact, Killian concluded Eisenhower even relied on the elite scientists' input too much:

One of the qualities of Eisenhower that troubled me during the course of my service to him was his almost exaggerated confidence in the judgment of the scientists that he had called upon to help him. He sometimes came to have a feeling that this group of scientists were endowed with an objectivity that he couldn't expect to find in other contacts that he had in government. And I think he over-estimated the capacity for objectivity that any kind of professional people . . . could demonstrate in regard to controversial problems. . . . [Nevertheless] he used the President's Science Advisory Committee and its panels constantly to appraise programs where there were inter-service rivalries involved.⁸¹

Eisenhower's final Secretary of Defense Thomas Gates concurred, "All of a sudden the scientists became very important. . . . They had great veto power. They became very important people."⁸² DDR&E York

⁷⁸ Detailed (largely verbatim) notes on meeting of the ODM Science Advisory Committee with the President on October 15, 1957, folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC, 5.

⁷⁹ Elwyn D. Harris, *Standard Spacecraft Procurement Analysis: A Case Study in NASA-DOD Coordination in Space Programs* (Rand Corporation, R-2619-RC, May 1980), 12.

⁸⁰ Killian, *Sputnik, Scientists and Eisenhower*, 240.

⁸¹ Killian interview, November 9, 1969 through July 16, 1970, 53-54.

explained that in the post-Sputnik Eisenhower administration the PSAC “. . . reviewed virtually every program of the Department of Defense, and many of those of the AEC and CIA as well. Few programs or ideas that did not meet their approval got very far.”⁸³ In sum, one effect of Sputnik was that “scientists were rushed to the most important single center of power, the Office of the President. . . .”⁸⁴

The scientists’ influence on the question of creating a civilian space organization was evident by the end of 1957. Groups of civilian scientists not affiliated with the government, such as the American Rocket Society (ARS), were submitting plans within a week of Sputnik’s launch for a civilian space organization. The ARS’s plan on October 10, 1957 suggested creating an Astronautical Research and Development Agency and recommended “. . . that a national space flight program be initiated; and second, that an agency having independent status similar to that of the Atomic Energy Commission [sic] or the National Advisory Committee for Aeronautics, be created to manage the program” consisting of all space-related R&D except “strictly military applications of space-flight techniques.”⁸⁵ Between this date and Killian’s formal recommendation for creating a NASA in the first week of March 1958, numerous other scientific organization either submitted similar plans for a civilian-managed space exploration organization or endorsed the general concept.⁸⁶

⁸² Cited in Charles S. Maier, “Science, Politics, and Defense in the Eisenhower Era,” in George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower’s Special Assistant for Science and Technology* (Cambridge, MA and London: Harvard University Press, 1976), xxix.

⁸³ Herbert F. York and G. Allen Greb, “Military Research and Development: A Postwar History,” *Bulletin of the Atomic Scientists* 33 (January 1977): 24.

⁸⁴ Warren R. Schilling, “Scientists, Foreign Policy, and Politics,” in Davis Dobrow, editor, *Components of Defense Policy* (Chicago: Rand McNally & Company, 1965), 156.

⁸⁵ “Space Flight Program,” Report by the Space Flight Technical Committee of the American Rocket Society, October 10, 1957, folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), 2.

⁸⁶ For instance, the National Academy of Sciences lobbied for a National Space Establishment and the Society of Professional Engineers for a Federal Space Exploration Commission. See Donald T. Rotunda, *The Legislative History of the National Aeronautics and Space Act of 1958*, NASA HHN-125 (NASA Historical Office, 1972), 21.

More important was Killian's work within the executive branch. Killian has said on November 10, only three days after his official appointment, Eisenhower told him one of his primary tasks was to determine the organizational structure of the U.S. space program. Killian recalled, "It was perfectly obvious that the military was terribly anxious to - at least, below the level of the civilian top command - to have responsibility for the space program. . . . there were strong indications from the DOD that the space program ought to be lodged in the DOD."⁸⁷ There was no chance of this happening. A PSAC meeting on December 10, 1957 revealed the predominant attitude of the government-affiliated civilian scientists. Detlev Bronk, President of the National Academy of Sciences (NAS), summarized for the group, "There are many aspects of the NACA worth looking into." Loyd Berkner, NAS member, concurred: "We want the controlling agency outside the DOD. Inevitably this type of space activity will be a powerful binding force." Killian agreed and said the key would be "If we could say NACA should have increased funds. . . . NACA is used to getting hardware from DOD. Its relationship to the military has enabled NACA to have experimental hardware built."⁸⁸ If nothing else, George Kistiakowsky (PSAC member, Eisenhower's second science adviser) recalled, "PSAC held that NACA had to be included simply to avoid creating two competitive bureaucracies."⁸⁹

On December 30 Killian wrote a memo summarizing his initial thoughts. He assumed the DoD would soon form a special organization to manage defense-related space R&D (this would be ARPA, see below). Therefore, even if a separate civilian agency were established, ". . . the DOD must play a major role in space research and development if we are to use the nation's manpower and facilities in this area to the greatest advantage." The DoD would be ". . . primarily concerned with those aspects of space research and development which will have military value" though it is hard to separate the civilian from the mili-

⁸⁷ Oral history interview of Killian, July 23, 1974, Biographical series, Killian file, NHDRC, 14.

⁸⁸ Minutes of PSAC meeting, *The Papers of the President's Science and Advisory Committee, 1957-1961*, part of the series *Science and Technology: Research Collections in U.S. Public Policy*, Alex Roland, General Editor, microfilmed from the holdings of the Dwight D. Eisenhower Library (Bethesda, MD: University Publications of America, 1986), 9, 12.

⁸⁹ Oral history interview of George Kistiakowsky, May 22, 1974, file: Kistiakowsky, box: Emme/Roland interviews on early NASA history, shelf: V-A-1, NHDRC, 21.

tary elements in space. While it would be "entirely feasible" for the DoD to handle all civilian and military space research and development. "Such an arrangement might improperly limit the program to narrowly concerned military objectives. In the second place, it would tag our basic space research as military and place the U.S. in the unfortunate position before the world of apparently tailoring all space research to military ends." Killian therefore viewed his basic challenge as "... devising the means for non-military basic space research while at the same time taking advantage of the immense resources of the military missile and reconnaissance satellite programs." In that sentence, Killian in fact identified the central challenge in the NASA-DoD relationship for the next ten years.⁹⁰

Killian foresaw the alternative that in two months he would officially recommend to Eisenhower: the DoD "... might confine itself to its military mission and some other agency or agencies external to the D.O.D. might engage in basic research. One obvious way of doing this would be to encourage N.A.C.A. to expand its space research and to provide it with the necessary funds to do so." Killian understood "... it would be necessary to carefully work out a cooperative arrangement with the D.O.D., for the D.O.D. would have to be an active partner with these agencies." Killian closed by emphasizing the necessity for fundamental scientific research in the space program, not prestige-related stunts: "We must have far more than a program which appeals to the 'space cadets'. . . . If we do not achieve this, then other nations will continue to hold the leadership."⁹¹ Killian's task for the next two months would be convincing Eisenhower of the wisdom of this basic course of action.

The civilian leadership of the DoD had no problems with Killian's basic concept. Richard Horner was Assistant Secretary of the Air Force for Research and Development and would become NASA's Associate Administrator in June 1959. He recalled that he, Quarles, and Secretary of the Air Force James Douglas discussed the organizational structure for space and decided

the best thing for the nation was to put this in the NACA. The rationalization as far as

⁹⁰ Killian, Memorandum on Organizational Alternatives for Space Research and Development, no addressed party, December 30, 1957, in John M. Logsdon, w/Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 629-30.

⁹¹ *Ibid.*, 630-31.

Donald Quarles was concerned, was that the Air Force had too many important eggs in the ballistic missile basket to divert its attention to doing other things. But there obviously was going to be a national response to Sputnik. Of course, Don was considerably troubled by the fact that he had made the Vanguard decision over the broken and bleeding body of the Air Force. . . . The Air Force was very acquisitive in those days, and they wanted to do everything, but they wanted more money than anybody else.

Therefore, Horner said, the Air Force and DoD leadership decided to support the general idea of a civilian organization.⁹² No specific bill would be drafted until March 1958, with submission to Congress on April 2.

Preludes to the Space Act

Before examining the immediate context of Eisenhower's draft of the National Aeronautics and Space Act (hereafter referred to as the Space Act) in early 1958, it is necessary to discuss two developments. First, Lyndon Johnson's Senate Preparedness Subcommittee Hearings added congressional fuel to the fire of many calls for action. Second, NACA campaigned to be named the organization responsible for civilian space exploration. These two trends set the stage for the Space Act making official the civil-military split in the United States space program.

Johnson and the Preparedness Subcommittee

Eilene Galloway was an acknowledged expert in national defense and science and technology in the Legislative Reference Service of the Library of Congress and was frequently detailed to congressional committees. After Sputnik, she was one of the key behind-the-scenes players in the congressional response to Sputnik, authoring many reports and briefing senators and representatives on the political and technological implications of the space age.⁹³ She recalls that shortly after Sputnik Lyndon Johnson called her up and said, "Eilene, I want to make me a record in outer space, and I want you to help me."⁹⁴ George Reedy was on the staff of the Senate Armed Services Committee's Preparedness Investigating

⁹² Richard Horner, oral history interview of, March 13, 1974, box: Emme/Roland interviews on early NASA history, shelf V-A-1, NHDRC, 46-47.

⁹³ For a verification of Galloway's role, see Alison Griffith, *The National Aeronautics and Space Act: A Study of the Development of Public Policy* (Washington, DC: Public Affairs Press, 1962), 72.

⁹⁴ Extracted from interviews contained in *The Legislative Origins of the Space Act: Proceedings of a Videotaped Workshop* (Space Policy Institute, George Washington University, April 3, 1992), 40 and confirmed by this author in an oral history interview of Galloway, June 2, 1995.

Committee headed by Johnson. Reedy wrote Johnson on October 17, 1957 that Sputnik as an issue "would blast the Republicans out of the water, unify the Democratic Party and elect you president. . . . Eye [sic] think you should plan to plunge heavily into this one." Reedy explained the racial integration issue was "a potent weapon which chews the Democratic Party to pieces" and is not going to go away. Therefore, the only possible response ". . . is to find another issue which is even more potent. Otherwise, the Democratic future is bleak."⁹⁵ A close reading of the three volume, 2,475-page transcript from the Preparedness Subcommittee's 110 days of hearings and 73 witnesses makes it clear the hearings were designed to meet these partisan objectives and not, as has so often incorrectly been stated, provide an objective look into the state of America's satellite and missile programs.

Johnson admits in his memoirs that even before the hearings started in November, "I was already convinced that our country was in trouble" and the hearings would have to ". . . determine what steps can be taken to strengthen our position and restore the leadership we should have in technology. . . . I knew one thing beyond doubt - we had to catch up."⁹⁶ Johnson entered the hearings with certain presumptions: there was a crisis that merited a dramatic response and there *was* a loss of American leadership in technology that had to be reclaimed. No witnesses were called from the Truman era to explain the relative lack of ICBM and satellite R&D between 1945 and Eisenhower's inauguration. Johnson opened the hearings by declaring all witnesses had to give ". . . a clear definition of the present threat to our security, perhaps the greatest that our country has ever known" and then offer specific recommended responses because "Our goal is to find out what is to be done. The facts that I learned so far give me no cause for comfort." Johnson emphasized, "It is not necessary to hold these hearings to determine that we have lost an important battle in technology. That has been demonstrated by the satellites that are whistling above our heads."⁹⁷ Not surprisingly, the witnesses who did take the stand all shared Johnson's presuppositions outlined above.

⁹⁵ George Reedy, memorandum to Lyndon Johnson, reprinted in Glen P. Wilson, "Lyndon Johnson and the Legislative Origins of NASA," *Prologue: Quarterly Journal of the National Archives* 25 (Winter 1993): 365.

⁹⁶ Johnson, *L'antage Point*, 273.

⁹⁷ *ISMP*, 2-3.

Edward Teller recommended accelerating and expanding the ballistic missile and submarine programs and building more civil defense shelters. Vannever Bush concurred and added science education should be strengthened. In the middle of the hearings Johnson offered a satirical poem expressing his opinion of Eisenhower's defense policy: "I'd rather be bombed than be bankrupt. I'd rather be dead than be broke. 'Tis better by far to remain as we are. And I'm a solvent if moribund bloke."⁹⁸ Administration officials such as Secretary of Defense McElroy tried to bring some balance by explaining that assessing Soviet versus American defense strengths was a matter of "toting up" because "they have certain strengths in excess of ours and we have certain strengths in excess of theirs."⁹⁹ Quarles added, "Taking the missile program as a whole, and comparing their own program with our own, I estimate that as of today our program is ahead of theirs." He also supported the United States decision to conduct Vanguard at a pace so that it would "... not interfere with the top priority of the ballistic missiles program. ... I believe there is no question that our near-term position is sound."¹⁰⁰ Nevertheless, the headlines regularly went to military officers such as Lieutenant General James Gavin, and others, who claimed, "From the straight estimate of the balance of military power, our position is exceedingly difficult." When asked if this meant the United States was behind the USSR, Gavin replied, "Yes, I would say we are."¹⁰¹

The specific question of the civil-military balance in responding to Sputnik received relatively little attention in the Preparedness Subcommittee's hearings: the vast majority of time and witnesses focused on directly military issues such as missiles, bombers, and the nuclear balance. The ABMA's von Braun did muse, "Suppose a National Space Agency were set up, either under the Secretary of Defense or as an independent agency, and this agency were given its own budget." Such an agency could conduct the American space program for \$1.5 billion per year. Von Braun said the DoD or an independent agency

⁹⁸ Ibid., 122.

⁹⁹ Ibid., 244.

¹⁰⁰ Ibid., 265, 284, 301.

¹⁰¹ Ibid., 511.

could do it, though scientists "would prefer having it an independent agency. . . . But I am convinced it would work either way."¹⁰² Representatives of the defense industry supported an independent agency.

General Schriever represented the uniformed military and openly discussed the Air Force's reconnaissance satellite, saying there has been a great deal of interest in it within the government. "But we got no approval for proceeding with this on a systems basis either on the Air Force secretarial level or at the Department of Defense secretarial level until just recently." He said the Air Force could launch a reconnaissance satellite "with a recoverable [film] capsule" by the spring of 1959 with adequate funding. In addition, Schriever emphasized ". . . at least 90 percent of what we are doing in the Air Force ballistic missile program, 90 percent of all this work can be directly applied to an astronautics or space program."¹⁰³

Neither Schriever nor the other officers were keen on the idea of an independent agency when it did arise. General John Medaris commanded the ABMA and said, "I cannot in conscience endorse an independent agency. . . . There is no need for creating a separate agency with operating characteristics outside the Defense Department for doing this job." Creating another bureaucracy ". . . will create a confusion that will set our program back a year."¹⁰⁴

Most of the Preparedness Subcommittee's 17 recommendations issued on January 23, 1958 concerned direct military actions such as dispersing the assets of the Strategic Air Command, building more bombers, missiles, and submarines, and improving the early warning system.¹⁰⁵ However, recommendation number 15 did touch on the organizational question: "Accelerate and expand research and develop-

¹⁰² Ibid., 603-04.

¹⁰³ Ibid., 1635, 1649.

¹⁰⁴ Ibid., 1710.

¹⁰⁵ A DoD official explained how the Preparedness Subcommittee obtained its recommendations. "They ask Defense to submit a week or so in advance a written report on what we are doing to catch up with the Soviets. Then, following the hearing, they issue to the press a report in which they urge Defense to do the very things we have said we are doing. The picture is clear: they are directing Defense, leading the nation in its frantic rush to reduce the state of peril, and we are gratefully - or perhaps even reluctantly - doing as we are told. We go along partly because we have no choice, and partly because these are the same individuals who have to approve our military budget and we can do nothing but lose if we fight them." See Gale, 232.

ment programs, providing funding on a long-term basis, and improve control and administration within the Department of Defense or through the establishment of an independent agency."¹⁰⁶ The overall tenor of the Subcommittee's conclusions was, "We are engaging in a race for survival and we intend to win that race."¹⁰⁷

Therefore, while the Preparedness Subcommittee did not specifically recommend creating a NASA, it did offer this as an option. More importantly, it continued to feed the crisis atmosphere into the beginning of 1958 and through extensive media coverage of its hearings created an expectation for some kind of program to issue forth from the Eisenhower administration. In a private meeting with the Democratic Conference on January 7, 1958, Johnson summarized his thoughts after the Preparedness Subcommittee's hearings: "The peril of the hour is obvious." Sputnik had opened up the realm of space and Johnson believed, "The exploitation of these capabilities by men of selfish purposes holds the awful threat of a world in subjugation. The mastery of such capabilities by men wholly dedicated to freedom presents, instead, the prospect of a world at last liberated from tyranny, liberated in fact from the fear of war."¹⁰⁸ Johnson's January 7, 1958 remarks to his Democratic colleagues are important because they indicate his state of mind concerning the role of space and his conclusions as expressed not for the media's consumption but as presented to his congressional associates.

In this context, Johnson declared that the America evaluation of the role of space so far had not been made by the "men most qualified to make such an appraisal. Our decision, more often than not, have been made within the framework of the government's annual budget. This control has, again and again, appeared and re-appeared as the prime limitation upon our scientific achievement." This must change, Johnson concluded, because

Control of space means control of the world, far more certainly, far more totally, than any control that has ever or could ever be achieved by weapons, or by troops of occupation.

¹⁰⁶ *ISMP*, 2428.

¹⁰⁷ *Ibid.*, 2429.

¹⁰⁸ Statement of Democratic Leader Lyndon B. Johnson to the Meeting of the Democratic Conference on January 7, 1958, folder: Armed Services, ICBM - Sputnik, box 584, Clinton P. Anderson papers, Library of Congress, 1.

From space, the masters of infinity would have the power to control the earth's weather, to cause drouth and flood, to change the tides and raise the levels of the sea, to divert the gulf stream and change temperate climates to frigid. . . . The urgent race we are now in - or which we must enter - is not the race to perfect long range ballistic missiles. There is something more important than any ultimate weapon. This is the ultimate position - the position of total control over earth that lies somewhere out in space. . . . Whoever gains that ultimate position gains control, total control, over the earth, for purposes of tyranny or for the service of freedom. . . . Our national goal and the goal of all free men must be to win and hold that position. Total security perhaps is possible now, for the first time in man's history. Total security - and, with it - total peace.¹⁰⁹

Lyndon Johnson's unfiltered views on the importance of space, primarily oriented toward national security, are cited extensively here because they represent his basic beliefs that would motivate his actions not only in Congress but beyond. As Vice President he still held these notions when Kennedy tasked him to determine how to beat the Russians in space. As president he probably started out with this same philosophical framework but the realities of diverse budgetary requirements began to modify his idea of space's importance in his full term (see chapter 9).

The Preparedness Subcommittee, far from being a nonpartisan fact-finding group, seemed to be part of the movement to push the Eisenhower administration into submitting some kind of formal organizational structure for space exploration. As one analyst of the Space Act concluded, the Subcommittee concluded, ". . . the country lacked leadership and that the Democrats would provide it, whether or not the administration went along."¹¹⁰ McDougall adds, "Day by day the witnesses rose to confirm the committee's suspicions and provide quotes for the next day's front pages" as well as "general and specific accounts of American humiliation [which] flowed through the press and public mind together, weakening faith in the administration and its values."¹¹¹ In short, the Subcommittee, ". . . markedly refrained from anything like a thorough and objective review of the development and implementation of the policies of the Eisenhower administration on missiles and satellites."¹¹² The Subcommittee's hearings can only be

¹⁰⁹ Ibid., 2-3, 5-6.

¹¹⁰ Enid Curtis Bok Schoettle, "The Establishment of NASA," in Sanford A. Lakoff, editor, *Knowledge and Power: Essays on Science and Government* (NY: The Free Press, 1966), 220.

¹¹¹ McDougall, 153-54.

¹¹² Rip Bulkeley, *The Sputniks Crisis and Early United States Space Policy: A Critique of the Historiography of Space* (Bloomington, IN: Indiana University Press, 1991), 11.

understood in light of the fact that they "were aimed primarily at achieving a transfer of the policy-making initiative."¹¹³

NACA Entered the Fray

The pace of policy making within the Eisenhower administration did, in fact, pick up after the first of the year. From the general Killian recommendations for a civilian space agency circulated in late December 1957 there would spring by early April 1958 the Space Act's submission to Congress for consideration. In this swirl of events, the NACA made its case as the most logical choice for the agency to head the civilian space exploration program. Of crucial significance is the fact that both NACA's Director Hugh Dryden and NACA's Chairman James Doolittle were members of PSAC during the 1957-58 time frame when Killian and PSAC forged the organizational structure for space.¹¹⁴ NACA's claim to be the most logical candidate for heading any independent civilian space organization was well-represented within the very group charged with making the organizational decisions.

On November 21, 1957 the NACA established a Special Committee on Space Technology to consider how to best use human capabilities in space exploration and outline how the NACA could develop its resources for space exploration. This committee did not issue its formal report until after NASA was created but it shows the NACA's early concern for evaluating its role in the space field. Dryden hosted a dinner on December 18 to determine the sentiments of some of NACA's younger employees concerning NACA's role in space R&D. It has been reported that "... sentiment was overwhelmingly in favor of NACA moving into the space field."¹¹⁵ Dryden tasked his staff to draw up a formalized space R&D plan and on January 14, 1958, NACA released "A National Research Program for Space Technology" which stated

It is of great urgency and importance to our country both from consideration of our prestige as a nation as well as military necessity that this challenge [Sputnik] be met by an energetic

¹¹³ Ibid., 196.

¹¹⁴ See Killian, *Sputnik, Scientists, and Eisenhower*, 277ff. for a complete list of PSAC's members during this period.

¹¹⁵ Robert L. Rosholt, *An Administrative History of NASA: 1958-1963*, NASA SP-4101 (Washington, DC: USGPO, 1966), 34.

program of research and development for the conquest of space. . . . It is accordingly proposed that the scientific research be the responsibility of a national civilian agency working in close cooperation with the applied research and development groups required for weapon-systems development by the military. The pattern to be followed is that already developed by the NACA and the military services. . . . The NACA is capable, by rapid extension and expansion of its effort, of providing leadership in space technology.

The NACA report went on to outline the specific fields in which it proposed to vastly expend its R&D activities so as to meet the space challenge, such as propulsion, vehicle configuration and structures, navigation and guidance, launch and rendezvous and bioastronautics, among many others.¹¹⁶

Dryden elaborated on NACA's proposal for a civilian space agency in a speech January 27, 1958. He recognized many scientists' fears that ". . . the extremely important nonmilitary aspects of space technology would be submerged or perhaps even lost if included as a mere adjunct to a military program." The solution was at hand and was in fact "old and well-tested:" the NACA. He explained NACA's proposal for a space exploration program earlier that month "can be most rapidly, effectively and efficiently implemented by the cooperative effort" of the NACA, DoD, NSF, NAS, civilian universities, research institutions, and industry. Dryden explained that ". . . the development and operation of military missiles, military satellites, and military space vehicles is clearly the function of the Department of Defense" but that additional vehicles for scientific research and exploration should be operated by NACA "when within its capabilities or jointly by the appropriate agencies of the Department of Defense and the National Advisory Committee for Aeronautics." The NAS and NSF would cooperate with NACA in selecting and planning the scientific experiments while assigning priorities for research; these two organizations would also render financial support.¹¹⁷ NACA's idea then was for a multi-institutional space exploration program in which NACA would take a lead role but work closely with other interested parties and not infringe on the DoD's prerogatives.

¹¹⁶ NACA, A National Research Program for Space Technology, January 14, 1958, folder: NACA documents, box: Administrative History, Pre-NASA Documents, NASA/DoD, shelf VI-C-6, NHDRC, 1-3.

¹¹⁷ Hugh Dryden, address to the Institute for Aeronautical Sciences, January 27, 1958, folder: NACA to NASA Transition, box: White House, Presidents, Eisenhower, Space Documentation (1957-1960), NHDRC, 1-3.

A document from either the White House or the BoB states these January 1958 NACA moves to claim a leading role in space exploration "had been cleared with Dr. Killian and possibly also with the White House. They received a favorable reaction among staff of the Bureau of the Budget who had already been thinking of NACA as the logical nucleus of a new aeronautics and space agency."¹¹⁸ The NACA's specific plan on February 10, 1958 was "A Program for Expansion of NACA Research in Space Flight Technology with Estimates of the Staff and Facilities Required." In it NACA went into extreme detail outlining the type of facilities required, the new staff that would need to be hired, the research program that would be conducted, and the necessary budget augmentations.¹¹⁹ In a personal and confidential letter to Dryden, Doolittle laid out the central problem: "It seems to me that the NACA is on the 'horns of a dilemma.' Unless it is given at least some part of the space program, it will decline with the airplane."¹²⁰ Dryden also verified the NACA's concern for its organizational existence in the early space age, recalling his conclusion was, "We've either got to be in space or run out of business."

We did decide that we wanted to stake out a role for NACA in whatever happened right from the beginning. And the minimum role . . . was to bear the same relation to whatever agency was set up to carry out the actual operations in space as NACA had had with the Defense Dept. We also felt that rather than take an aggressive position in the matter that the best attitude was to play it down a bit . . . but to express this minimum claim. . . . This paid off in the long run. . . . We never took the offensive.¹²¹

PSAC and "Introduction to Outer Space"

The discussion can now return to Eisenhower's inner circle and the move toward creating NASA in early 1958. The first important meeting Eisenhower had on space organizational question was Febru-

¹¹⁸ Memorandum, specific executive branch authorship unknown. Sequence of Events in the Development of the National Aeronautics and Space Act of 1958, April 8, 1958, box: White House, Presidents, Eisenhower, National Aeronautics and Space Act, W/H and BoB Space Act documents from National Archives (Record Group 51), 1.

¹¹⁹ Reprinted in Alex Roland, *Model Research: The National Advisory Committee for Aeronautics, 1915-1958, Volume II*, 730ff.

¹²⁰ James Doolittle, letter to Hugh Dryden, March 28, 1958, folder: Testimony on Space Act, box: White House, Presidents, Eisenhower, National Aeronautics and Space Act, NHDRC, 1. At the end of this letter Doolittle wrote, "There are no other copies of this letter except yours and mine."

¹²¹ Oral history interview of Hugh Dryden, September 1, 1965, folder: Dryden, Mercury Tape, Dryden subseries, Deputy Administrators series, NHDRC, 2-3, 6.

ary 4, 1958 with Republican congressional leaders. When asked concerning his organizational plans for space, Eisenhower at this point still favored keeping everything within DoD:

The President's feeling was essentially a desire to avoid duplication, and priority for the present would seem to rest with Defense because of paramountcy of defense aspects. However, the President thought that in regard to non-military aspects, Defense would be the operational agent. . . . The President was firmly of the opinion that a rule of reason had to be applied to these Space projects - that we couldn't pour unlimited funds into these costly projects where there was nothing of early value to the Nation's security. . . . he didn't want to just rush into an all-out effort on each one of these possible glamor performances without a full appreciation of their great cost.

Nixon pressed the point that the United States should set up a separate agency for "peaceful research projects because the military would not undertake projects without potential military value. But Eisenhower "thought Defense would inevitably be involved since it presently had all the hardware, and he did not want further duplication. He did not preclude having eventually a great Department of Space."¹²²

At a conference after this meeting with Killian, "The President said that space objectives relating to Defense are those to which the highest priority attaches, because they bear on our immediate safety. He recognized that the psychological factor is of importance to our security. . . . He did not think that large operating activities should be put in another organization, because of duplication, and did not feel that we should put talent etc. into crash programs outside the Defense establishment." Eisenhower's only proviso was that "Defense get its own organization correct, i.e., that there is a central organization to handle this in defense."¹²³ (See ARPA discussion below.) At the end of this second February 4, 1958 meeting Eisenhower specifically tasked Killian to work out, once and for all, a concrete organizational structure for space exploration, both civilian and military.

At a press conference the next day Eisenhower explained, "I have gotten a group of fine scientists under the chairmanship of Dr. Killian. . . . He is getting the scientists to give for the United States a program of outer space achievement."¹²⁴ During the next month Eisenhower would drop his idea of the DoD

¹²² L.A. Minnich, Jr., Legislative Leadership Meeting - Supplementary Notes, February 4, 1958, folder: Staff Notes, February 1958, box 30, DDE Diary series, Ann Whitman file, DDEL, 1-2.

¹²³ Memcon, February 4, 1958, *supra*, 3-4.

¹²⁴ *Public Papers of the Presidents, 1958*, 142.

handling all aspects of space R&D because "Killian persuaded Eisenhower that a civilian agency was the better choice."¹²⁵ Congressional opposition to DoD primacy also probably played a role and so did the growing problem of interservice rivalry in space, which may have soured Eisenhower on the idea of augmenting the military's responsibilities in the primarily scientific arena of civilian space exploration. As Robert Divine states, by the first week of March, "Whatever early attraction he had had to a purely military agency now had given way to strong support for NASA as a body that would appeal not only to American scientists but to world opinion in general."¹²⁶

The key document in Eisenhower's sanctioning the creation of NASA was Killian's report on March 5 responding to Eisenhower's February 4 tasking. The "Memorandum for the President: Organization for Civil Space Programs" concluded that "... an aggressive space program will produce important civilian gains in the form of advances in general scientific knowledge and the protection of the international prestige of the United States. These benefits will be in addition to such military uses of outer space as may prove feasible." It said civilian domination of the space program was suggested by the overwhelming civilian interests inherent in it and by "... public and foreign relations considerations. However, civilian control does not envisage taking out from military control projects relating to missiles, anti-missile defense, reconnaissance satellites, military communications, and other technology relating to weapons systems or direct military requirements."¹²⁷

This March 5, 1958 Killian memo listed the three main reasons why leadership of the civil space program should be lodged in a "strengthened and redesignated" NACA: it was a "going Federal research agency" with 7,500 employees and \$300 million worth of laboratories and test facilities and it could expand its research program "with a minimum of delay;" its aeronautical research "has been progressively involving it in technical problems associated with space flight" such as rocket engines, materials, and

¹²⁵ Hall, "The Eisenhower Administration and the Cold War," 65.

¹²⁶ Divine, *Sputnik Challenge*, 104.

¹²⁷ James R. Killian, Jr., Percival Brundage, Nelson Rockefeller, Memorandum for the President: Organization for Civil Space Programs, March 5, 1958, folder: No. 174, Space Program, 1958-60, box 169, President's Advisory Committee on Government Organization, DDEL, 2.

designs and its future would be in doubt with responsibility for space: "NACA has a long history of close and cordial cooperation with the military departments" and so "the tradition of comity and civil-military accommodation which has been built up over the years will be a great asset in minimizing friction between the civilian space agency and the Department of Defense."¹²⁸

Killian et. al. recognized NACA's liabilities: little experience on projects beyond aircraft and missiles or with large scale developmental contracts; the DoD already employed most scientists working on rocket engines and space vehicles and the industrial firms in those areas; the NACA "is not in a position to push ahead with the immediate demonstration projects which may be necessary to protect the nation's world prestige" and so the military may have to handle such projects for a period of time; NACA only spends approximately \$100 million while the space program will be "substantially in excess" of this.¹²⁹ Killian's remedy was an all-out effort to draft a new law and submit it to Congress in the current session to address these shortcomings and begin a civilian space exploration program before the end of 1958.

Eisenhower approved Killian's memo at a March 6, 1958 NSC meeting and said, "Let's get a bill prepared at the earliest possible opportunity."¹³⁰ Killian explained his conclusions and Eisenhower vigorously nodded his approval, pleased to have confirmation of the viewpoint he had reached in the period since the first week of February.¹³¹ Eisenhower was so impressed he had Killian assemble a PSAC team to brief the rest of the government on the pending space program. These briefings were in turn so successful that Eisenhower had Killian and PSAC create a small booklet, "Introduction to Outer Space," designed for nationwide distribution, released on March 26, 1958.

"Introduction to Outer Space" is one of this chapter's two seminal policy documents, the other being the Space Act itself. It succinctly stated the fundamental space policy principles that would guide

¹²⁸ Ibid., 3-5

¹²⁹ Ibid., 6-7.

¹³⁰ July 23, 1974 Killian oral history, *supra*, 36.

¹³¹ Ibid., 24, and Divine, *Sputnik Challenge*, 105.

the remainder of Eisenhower's term.¹³² Eisenhower called it "the most interesting and fascinating thing in this field that I have seen, and I want to make it available to the entire public."¹³³ It subsequently appeared in the *New York Times* and other major newspapers as well as the *Readers Digest* and other periodicals. He also wrote its introduction and stated, "This is not science fiction. This is a sober, realistic presentation prepared by leading scientists. . . . it clarifies many aspects of space and space technology in a way which can be helpful to all people as the United States proceeds with its peaceful program in space science and exploration." Eisenhower sounded the space for peace clarion call: ". . . we and other nations have a great responsibility to promote the peaceful use of space and to utilize the new knowledge obtainable from space science and technology for the benefit of all mankind."¹³⁴

Why explore space? PSAC's "Introduction" offered four reasons. First, "the compelling urge of man to explore and to discover, the thrust of curiosity." Second, the "defense objective" in which "We wish to be sure that space is not used to endanger our security. If space is to be used for military purposes, we must be prepared to use space to defend ourselves." Note the use of the conditional "If" in PSAC's formulation. Third, national prestige: ". . . to be strong and bold in space technology will enhance the prestige of the United States among the peoples of the world and create added confidence in our scientific, technological, industrial and military strength." This reinforces the point made previously that Eisenhower could accept some prestige-oriented projects: it would turn out, however (as will be shown in chapter 5), that human spaceflight was not one such project: as PSAC pointed out, ". . . the cost of trans-

¹³² There were two official NSC space policies for internal administration use that were successors to NSC 5520. NSC 5814/1 of August 18, 1958 and NSC 5918 of January 26, 1960 (more correctly referred to as National Aeronautics and Space Council (NASC), "U.S. Policy on Outer Space" because Eisenhower directed it be circulated within the government not as an NSC document but as an NASC document). These two policy statements did not go much beyond the principles elucidated in "Introduction to Outer Space" with one exception. Since 5814/1 and 5918 were internal governments and therefore classified, they discussed in detail reconnaissance satellites: "Introduction to Outer Space" had nationwide distribution and mentioned only the general idea of reconnaissance from space.

¹³³ Eisenhower at News Conference, March 26, 1958, *Public Papers of the Presidents, 1958*, 233.

¹³⁴ PSAC, "Introduction to Outer Space," March 26, 1958, *Exploring the Unknown, Volume I*, 332. It should be noted that Killian contacted Lyndon Johnson's staff to ascertain if they wanted to be briefed on the administration's conclusions. "And we got back the response that the committee [Senate Special Committee on Space and Astronautics, formed February 6, 1958] did not need any advice or material from the White House with regard to space." See Killian oral history, July 23, 1974, *supra*, 27.

porting men and material through space will be extremely high, but the cost and difficulty of sending *information* through space will be comparatively low.”. Finally, space offered “. . . new opportunities for scientific observation and experiments which will add to our knowledge and understanding of the earth, the solar system, and the universe.”¹³⁵

“Introduction” also laid out the Eisenhower administration’s policy on the military use of space: “There are important, foreseeable, military uses for space vehicles. These lie, broadly speaking, in the fields of *communication* and *reconnaissance*. To this we could add meteorology. . . .” PSAC admitted reconnaissance from 200 or more miles up would be a challenge, telescopic cameras meant “it is certainly feasible to obtain reconnaissance with a fairly elaborate instrument, information which could be relayed back to earth by radio.” Beyond this, PSAC was not enthusiastic concerning the military use of space:

Much has been written about space as a future theater of war, raising such suggestions as satellite bombers, military bases on the moon, and so on. For the most part, even the more sober proposals do not hold up well on close examination or appear to be achievable at an early date. Granted that they will become technologically possible, most of these schemes, nevertheless, appear to be clumsy and ineffective ways of doing a job. . . . In short, the earth would appear to be, after all, the best weapons carrier.¹³⁶

This conclusion effectively retarded the development of expensive, forward-looking military spaceflight projects not only throughout the balance of the Eisenhower administration but also into Kennedy’s. The Air Force struggled year after year to convince the civilian policymakers that there was a legitimate reason for military officers to operate in space. The Air Force’s quest ultimately failed with the Dynasoar’s cancellation in 1963 and with MOL’s cancellation in 1969.

Finally, the Eisenhower administration’s timetable for space accomplishments as laid out by PSAC had the categories of Early (things like physics, meteorology, experimental communications), Later (astronomy, human flight in orbit), Still Later (only in this category did human lunar exploration and return appear), and Much Later Still (human planetary exploration). PSAC closed by saying the United States must be “. . . cautious and modest in our predictions and pronouncements about future space ac-

¹³⁵ PSAC, Introduction to Outer Space, SPI document 2, pp. 1-2, 5. Emphasis in original. This portion of the document is not reprinted in *Exploring the Unknown, Volume I*.

¹³⁶ *Ibid.*, 12. Emphasis in original.

tivities - and quietly bold in our execution."¹³⁷ The race mentality was clearly not present. As Eisenhower said in his memoirs, information from purely scientific exploration should "... be made available to all the world. But military research would naturally demand secrecy. The highest priority should go of course to space research with a military application, but because national morale, and to some extent national prestige, could be affected by the results of peaceful space research, this should likewise be pushed, but through a separate agency."¹³⁸

It is difficult to avoid the conclusion that Eisenhower was not overly enthusiastic about creating a civilian space agency but saw it as "... a preemptive strike to prevent something less wise from being done. ... Eisenhower had to act authoritatively or take a political beating from his rivals in Washington. ... Left to his own devices, President Eisenhower would have been quite pleased to undertake a modest space program that was oriented toward practical applications. His type of space program was motivated by a realistic desire to invest limited funds in space systems with military and other applications rather than to engage in what he characterized as space stunts." However, lacking the luxury of a perfect world, Eisenhower accepted the creation of NASA "... because it was the least bureaucracy he could get away with in the post-Sputnik crisis atmosphere. ..."¹³⁹

Balancing Civilian and Military Responsibilities in Space

The drafting of the Space Act took place between the March 6 meeting and the submission of the administration's proposed version to Congress on April 2, 1958. The bill was crafted by representatives from PSAC and the BoB; one historian explains, "The Department of Defense was not brought into the picture until the end of March when the draft bill was sent to various agencies for comment."¹⁴⁰ Nonetheless, during the March-April period the DoD had "no strong objections" to the idea of expanding the NACA into a space agency because, Killian recalled, Quarles acted as DoD's point man for space and

¹³⁷ Ibid., 14-15.

¹³⁸ Eisenhower, *Waging Peace*, 257.

¹³⁹ Roger D. Launius, "Eisenhower, Sputnik, and the Creation of NASA," *Prologue: The Quarterly Journal of the National Archives and Record Administration* (Summer 1996): 128-129, 138.

¹⁴⁰ Rosholt, 10.

"... was extremely sensible and understanding about the whole program, and very tough about his views of the Department of Defense taking on more than it needed for defense purposes."¹⁴¹ This chapter will close with an examination of how Congress modified the civil-military balance of power portion of Eisenhower's proposal and in what form the civil-military question finally became law. However, one preparatory topic must first be explored: exactly what was taking place in the military space field after Sputnik and how did it help convince Eisenhower to endorse the idea of a civilian agency for scientific space exploration?

Interservice Rivalry and the Creation of ARPA

One component of the military's post-Sputnik program was that the ABMA launched America's first satellite, Explorer I on January 31, 1958. As the post-Sputnik clamor grew for an American satellite and it was clear the NRL's Vanguard program could not easily be accelerated, Eisenhower told the DoD on October 8 to "do what is necessary to have the Redstone ready as a backup."¹⁴² The Secretary of Defense authorized the Army on November 8, 1957 to take the necessary specific steps to configure a Jupiter C (a Redstone modified into an IRBM) to launch a satellite. Vanguard was given the first chance, however. But on December 6, 1957 it rose a few inches from its launch pad and exploded. Lyndon Johnson called it "one of the best publicized and most humiliating failures in our history." Pundits quipped it should be called Dudnik, Flopnik, Stayputnik or Kaputnik. At the United Nations the Soviets offered the United States the same kind of technical assistance it made available to underdeveloped nations.¹⁴³ The Army proceeded expeditiously and within eight weeks launched America into space, which "... invoked an all but audible sigh of relief across the country."¹⁴⁴

¹⁴¹ July 23, 1974 Killian oral history, 25-26.

¹⁴² Memcon, October 8, 1957, folder: October 1957 Staff Notes (2), box 27, DDE Diary Series, Ann Whitman file, 3.

¹⁴³ Cited in Derek W. Elliott, *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963*, Ph.D. dissertation (George Washington University, 1992), 62. Soviet offer in Constance Green and Milton Lomask, *Vanguard: A History*, NASA SP-4202. (Washington, DC: USGPO, 1970), 202.

¹⁴⁴ Green and Lomask, 210.

More directly germane to the discussion of the civil-military issue and why Eisenhower enshrined a dual program in the Space Act was the fact both before and after Explorer, the "Army sought a major role in military space technology."¹⁴⁵ The Army had launched the first satellite and the ABMA was doing most of the work in very large rocket engines with over one million pounds of thrust (the Air Force's Atlas ICBM had approximately 300,000 pounds¹⁴⁶). The Air Force's WS-117L had been officially under-way since March 1955 (and the concept intensely studied since 1950) and the Air Force was in the process of drawing up detailed plans for a man-in-space program (see chapter 5). The Navy was the supervising service for the NRL which in turn had responsibility for the Vanguard satellite effort. Eisenhower was not impressed with this proliferation, though of course he played an important role by permitting it. Nevertheless, he would take steps to control it, first by creating NASA, and second by creating ARPA.

The Air Force was perhaps most vocal in its post-Sputnik drive for increased space responsibilities and programs. It created a special panel under Edward Teller right after Sputnik "... to examine possible USAF [United States Air Force] contributions to a United States technical demonstration which would counter world reaction to the USSR earth Satellite."¹⁴⁷ Not surprisingly, Teller's committee concluded, "The USSR has acquired a momentum in technical progress which will permit a widening choice of weapon systems for rapid and economical development." To recover its scientific and technological momentum, the United States must develop "... a sustained long range program of research and experimental development which ... will assure that as yet unrecognized opportunities for military influence can be rapidly translated into the form factors of weapon systems."¹⁴⁸

Teller further recommended putting "the ballistic missile and space flight programs on a maximum effort basis in all its aspects, without reservation as to time, dollars or people used." The DoD's

¹⁴⁵ Loyd S. Swenson, Loyd Jr., James M. Grimwood and Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966), 79.

¹⁴⁶ Norman Polmar and Timothy Laur, *Strategic Air Command: People, Aircraft and Missiles*, 2nd edition, (Baltimore: Nautical & Aviation Publishing Company, 1990), 299.

¹⁴⁷ *Report of the Teller Ad Hoc Committee*, October 28, 1957, Air Force History Support Office, Washington, DC (AFHSO), K140.11-3, p. 1.

¹⁴⁸ *Ibid.*, 4.

R&D budget should be "inviolable against financial restrictions" because "If we continue to lag behind the USSR in the conquest of space, we risk losing our deterrent ability." This would all be spearheaded by the USAF, which should "now undertake to equal and surpass the Russian achievement. Existing Air Force programs will, if vigorously supported and pushed forward, give our nation the needed capability."¹⁴⁹

USAF leaders and official doctrine soon incorporated the idea that space was a natural Air Force responsibility. Chief of Staff Thomas White (the USAF's top-ranking officer) declared on November 29, 1957:

I feel that in the future whoever has the capability to control space will possess the capability to exert control of the surface of the earth. . . . We airmen who have fought to assure that the United States has the capability to control the air are determined that the United States must win the capability to control space. . . . I wish to stress that there is no division, per se, between air and space. Air and space are an indivisible field of operations.¹⁵⁰

The Air Force's institutional thinking was expressed in a memo from its R&D branch: "The Air Force, with greater justification than any other service, should be primarily responsible for the Astronautics (space) mission. . . . With any stretch of the imagination, the Air Force is the Service legitimately having the greatest responsibility for extending its present three-dimensional mobility out further into space." The only element lacking was "the administrative intestinal fortitude to take appropriate actions within its own sphere of prerogative to begin such work, and at the proper time so notify the DOD."¹⁵¹ By December 1959 the Air Force had coined the term "aerospace" and incorporated it into its official doctrine manual: "The aerospace is an operationally indivisible medium consisting of the total expanse beyond the earth's surface. The forces of the Air Force comprise a family of operating systems - air systems, ballistic missiles, and space vehicle systems. These are the fundamental aerospace forces of the nation."¹⁵²

¹⁴⁹ Ibid., 9-11.

¹⁵⁰ Cited in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960*, volume I, (Maxwell Air Force Base, AL: Air University Press, 1989), 550.

¹⁵¹ William Weitzen, Deputy for Operations, Research, and Development, Memorandum to Assistant Secretary of the Air Force for R&D Richard Horner, Subject: Astronautics Planning, December 18, 1957, K168.8636-9, AFHRA, 1. Declassified at author's request.

¹⁵² Cited in Lee Bowen, *Threshold of Space: The Air Force in the National Space Program, 1945-1959* (USAF HDLO, 1960), NSA MUS document 314, p. 18.

These concepts are moderate compared to some from elsewhere within the Air Force. In a January 28, 1958 speech Brigadier General Homer Boushey posited, "The moon provides a retaliation base of unequaled advantage. . . . It has been said that 'He who controls the moon, controls the earth.' Our planners must carefully evaluate this statement, for, if true (and I for one think it is), then the United States must control the moon."¹⁵³ He elaborated, ". . . the moon represents the age-old advantage of 'high ground.' . . . Lunar outposts and even launch sites could be located on the far side of the moon - never to be seen from earth - yet earth locations could be viewed by telescope from the moon."¹⁵⁴ The Air Force's Deputy Chief of Staff for Development, Lieutenant General Donald Putt supported a military base on the moon while testifying to Congress in March 1958 and declared this was ". . . only a first step toward stations on planets far more distant from which control over the moon might be exercised."¹⁵⁵

One should not think Boushey and Putt were unrepresentative crackpots. On December 10, 1957 the Air Force attempted to create a new Directorate of Astronautics and named Boushey as its commander. However, the "OSD reacted unfavorably," with one of its officials stating the Air Force "wanted to grab the limelight and establish a position." The Secretary of Defense opposed the USAF creating a space organization and felt it was an Air Force bid for popular support.¹⁵⁶ Eisenhower reportedly "hit the roof" and phoned McElroy from a NATO meeting in Paris to express his displeasure.¹⁵⁷ Under such pressure, the Air Force disbanded its new Astronautics Directorate on December 13, making it the shortest-lived Directorate ever in the USAF. Given Eisenhower's space for peace policy designed to overtly emphasize civilian scientific exploration and covertly divert attention away from reconnaissance satellites, this type of bold Air Force rhetoric was most certainly not welcome at the presidential level. Eventually

¹⁵³ Cited in Eugene M. Emme, *The Impact of Air Power: National Security and World Politics* (Princeton, NJ: D. Van Nostrand Co., 1959), 872.

¹⁵⁴ Brigadier General Homer A. Boushey, Deputy Director for Research and Development, USAF, "Who Controls the Moon Controls the Earth," *US News and World Report* (February 7, 1958): 54.

¹⁵⁵ Cited in Divine, *Sputnik Challenge*, 98.

¹⁵⁶ Bowen, 109-111.

¹⁵⁷ Oral history interview of USAF Lieutenant General Donald E. Putt, Deputy Chief of Staff for Development, April 30, 1974, file: Donald E. Putt, Biographical series, NHDRC, 36.

the Air Force was permitted to establish an innocuously titled Directorate of Advanced Technology under Boushey in July 1958 to supervise space projects.

The Air Force drafted bold plans after Sputnik for a large space program. Schriever's Ballistic Missile Division (BMD) submitted a plan to the OSD in January 1958 for FY59 that totaled \$1.5 billion and included the following programs: R&D test vehicles; satellite reconnaissance systems; lunar-based intelligence-gathering system; orbital defense systems; logistics requirements for lunar transport; and strategic communications.¹⁵⁸ The civilian Undersecretary of the Air Force Malcolm MacIntyre explained, "A space warfare capability on the part of the United States is vital to the survival of the free world. . . . We must seek out every possible means of acquiring a military capability to control space - or to deny that capability to an enemy."¹⁵⁹ The gulf between Air Force space thinking and civilian OSD leaders' space thinking is revealed by the fact that the Air Force was told to program for only \$177 million in FY59 of this \$1.5 billion request.¹⁶⁰

This type of rhetoric was by no means limited to the Air Force, nor was the striving for institutional advantage. The ABMA's Wernher von Braun told Congress, "I have not the slightest doubt that the question of whether we or another nation has control of the spaces around the earth will have a very great impact on our military position on the earth itself. In other words, space superiority, control of the spaces around the earth, will soon be just as important as air superiority is today."¹⁶¹ To counter these statements emphasizing military control of space and the role of the services, Eisenhower turned to "his scientists," e.g., Killian and the members of PSAC.

As Killian has written, he and the other civilian scientists affiliated with the government ". . . felt compelled to ridicule the occasional wild-blue-yonder proposals by a few air force officers for the exploi-

¹⁵⁸ Air Force Systems Command, Space Systems Division, *Chronology of Early Air Force Man-in-Space Activity* (AFSC Historical Publications Series 65-21-1, 1965) NSA MUS document 446, p. 13.

¹⁵⁹ Congress, Senate, Special Committee on Space and Astronautics, *National Aeronautics and Space Act*, 85th Congress, 2nd Session, 1958, p. 192.

¹⁶⁰ Bowen, *An Air Force History of Space Activities*, 134.

¹⁶¹ Congress, House, Select Committee on Astronautics and Space Exploration, *Astronautics and Space Exploration*, 85th Congress, 2nd Session, 1958, p. 37.

tation of space for military purposes. . . . these officers, often more romantic than scientific, made proposals that indicated an extraordinary ignorance of Newtonian mechanics, and the PSAC made clear to the president the inappropriateness of these proposals."¹⁶² Dr. Lee A. DuBridge of PSAC and President of the California Institute of Technology, told Congress that ". . . in many cases it will be found that a man contributes nothing or very little to what could be done with instruments alone" and added that a military lunar base was not necessary because "It is clearly easier, cheaper, faster, more certain, more accurate to transport a warhead from a base in the United States to an enemy target on the other side of the earth than to take the same warhead . . . and then shoot it back from the moon."¹⁶³ DuBridge warned against "wild programs of Buck Rogers stunts and insane pseudomilitary expeditions."¹⁶⁴ A Killian staffer simply pointed out, "We can discount at this point most of the 'Buck Rogers' type of thinking which anticipates hordes of little men in space helmets firing disintegrators into each other from flying saucers."¹⁶⁵ Perhaps harsh but indicative of the lack of tolerance within the Eisenhower administration for open speculation concerning the military uses of space.

Killian reported, "President Eisenhower was disturbed by the numerous space proposals by the military services which did not contribute to national security. The services were fighting for 'weapons systems in space,' which neither PSAC nor BoB regarded as consistent with the President's view."¹⁶⁶ However, rhetoric was not the only military tendency leading Eisenhower to eventually support the creation of NASA. The bitter interservice rivalry which had characterized the ballistic missile field and had bedeviled Eisenhower since he accelerated the program in 1954 appeared likely to spread from the missile

¹⁶² Killian, *Sputnik, Scientists, and Eisenhower*, 112.

¹⁶³ House Select Committee, 780-81.

¹⁶⁴ Cited in Divine, *Sputnik Challenge*, 98.

¹⁶⁵ S. Paul Johnson, memorandum for Killian, Preliminary Observations on the Organization for the Exploitation of Outer Space, February 21, 1958, *Exploring the Unknown, Volume I*, 633.

¹⁶⁶ Killian oral history, July 23, 1974, p. 5.

field and into the space arena.¹⁶⁷ In response Eisenhower not only created NASA but authorized the creation of ARPA as a separate OSD-level space agency to manage the military space projects and hopefully prevent interservice conflict.

A week after Sputnik Eisenhower volunteered, “. . . he sometimes wondered whether there should not be a fourth service established to handle the whole missiles activity. . . . The President suggested that Mr. McElroy let people know . . . that he will deal with a very heavy hand in putting his own ideas into effect.”¹⁶⁸ Yet several days later someone leaked to the trade press specific information concerning the WS-117L program,¹⁶⁹ part of a deliberate effort one scholar describes as “. . . a stream of sensitive information [which] began to flow from individuals within the Air Force directly to congressmen considered sympathetic to USAF views on military research and procurement.”¹⁷⁰ One anonymous OSD official quipped, “I have not heard it suggested that any of the services has employed poisonous drugs or physical violence in its struggles against the others, but few other weapons are neglected.”¹⁷¹

Primary sources amply support these assessments. General John Medaris’ memoirs feature several vitriolic attacks on the Air Force and its managerial competence.¹⁷² On November 19, 1957 the Army submitted to the OSD a proposal for a satellite reconnaissance system that would largely duplicate the Air Force’s 117L because “. . . the Army can satisfy the Nation’s and its allies’ urgent requirement for accurate and timely intelligence from within the USSR in less time, for less cost, and with a greater assur-

¹⁶⁷ For a full account of interservice problems in the early missile programs, see Michael H. Armacost, *The Politics of Weapons Innovation: The Thor-Jupiter Controversy* (New York: Columbia University Press, 1969).

¹⁶⁸ Memcon, October 11, 1957, folder: October 1957 Staff Notes (2), box 27, DDE Diary series, Ann Whitman File, DDEL, 2.

¹⁶⁹ “USAF Pushes Pied Piper Space Vehicle,” *Aviation Week* (October 14, 1957): 26.

¹⁷⁰ John Prados, *The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength* (New York: The Dial Press, 1982), 59.

¹⁷¹ Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana, IL: University of Illinois Press, 1964), 200.

¹⁷² John B. Medaris, Major General, US Army, Retired, w/Arthur Gordon, *Countdown for Decision* (New York: G.P. Putnam’s Sons, 1960).

ance of success than any other agency." The Army openly proclaimed its satellite system would "serve as a logical first step in achieving a true 'conquest of space.'" The Army stated that with its ABMA and von Braun, "Nowhere else in this nation does there exist a comparable reservoir of proven experience and competence."¹⁷³ The Army even proposed its own human spaceflight program, Project Adam, justified as research into "large scale transport by troop-carrier missiles" which would also "enhance the technological prestige of the United States in the eyes of its friends, allies and citizens."¹⁷⁴ Even the Navy had a human spaceflight proposal called "Manned Earth Reconnaissance" which called for a cylindrical spacecraft with spherical ends that could become a delta-winged inflatable glider once in orbit.¹⁷⁵

The Air Force worried about the Army launching America's first satellite because "... the Army can certainly be expected to beat the drums for the assignment of satellite and space projects exclusively to the Army. . . . This will place the Army in a most favorable position in regard to future space problems."¹⁷⁶ The Air Force also worried about the consequences of a successful Vanguard launch by the Naval Research Laboratory: "If the Vanguard program continues and has a lucky success, two things must be considered: a. The Navy will have a basis for claims on space roles. b. The civilian scientists will be able to claim success."¹⁷⁷

Such dissension distressed Eisenhower, who often expressed, as he did on February 4, 1958, "that he has come to regret deeply that the missile program was not set up in OSD rather than in any of the

¹⁷³ US Army, briefing on satellite reconnaissance system, November 19, 1957, folder: Space, November 1957 (2), box 15, Office of the Special Assistant for Science and Technology (OSAST), White House Office, DDEL, 1-2, 11.

¹⁷⁴ ABMA Report No. D-TR-1-58, Development Proposal for Project Adam, April 17, 1958, folder: ABMA (Project Adam), DoD subseries, Federal Agencies series, NHDRC, 1-2.

¹⁷⁵ See Linda Neumann Ezell, *NASA Historical Data Book Volume II: Programs and Projects 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 94; and Swenson, et. al., *This New Ocean*, 100.

¹⁷⁶ Colonel Asa Gibbs, Air Force Liaison Officer for Project Vanguard, to General Putt, Memorandum, Subject: Vanguard-Jupiter C Firings, January 17, 1958, folder: USAF Documents/ Correspondence (1957-1961), DoD subseries, Federal Agencies series, NHDRC, 1-2.

¹⁷⁷ Office of the Deputy Chief of Staff for Development, Memorandum for record, Subject: Comments on Project Vanguard, to Richard Horner, February 6, 1958, folder: USAF Documents/ Correspondence (1957-1961), DoD subseries, Federal Agencies series, NHDRC, 2.

services." When DDR&E Herbert York mentioned ABMA was highly competent and interested in a permanent role in the space program. "The President quickly interjected a caution not to put the satellite job in any of the services." Eisenhower emphasized he wanted to see the space program "kept out of service politics."¹⁷⁸ An expanding military role in the space program was highly unlikely in these circumstances. As York summarized, each service could justify building any rocket or satellite it so desired and why it could handle the task better than the other services: "There just was confusion, chaos, unnecessary duplication at the highest level."¹⁷⁹

Eisenhower's response to this situation was not only to place the civilian space exploration program under NASA but to create the Advanced Research Projects Agency. McElroy first discussed on November 1, 1957 the administration's intention to create a special weapons laboratory that "... would limit its operations to research and exploratory development, it would not affect Military Department roles and missions."¹⁸⁰ Then on November 20 he explained to Congress his plans for a "special projects" agency whose duty would be to unify the space projects scattered among the three services so that the OSD could control interservice rivalry in what McElroy termed "all our effort in the satellite and space research field."¹⁸¹ McElroy added the new agency would have "single control in some of our most advanced development projects."¹⁸² He told Johnson's Preparedness Subcommittee that ARPA meant, "There is not going to be any satellite program in the services except as directed by the Advanced Research Projects Agency. ... the entire program will be directed and controlled by a single agency."¹⁸³

¹⁷⁸ Memcon, February 4, 1958, *supra*, 2.

¹⁷⁹ York oral history of January 24, 1989, *supra*, 41.

¹⁸⁰ Secretary of Defense Neil McElroy, transcript of remarks at Secretary of Defense luncheon, November 1, 1957, NSA MUS document 270, p. 3.

¹⁸¹ Bowen, *Air Force History of Space Activities*, 103.

¹⁸² Reprinted in Congress, House, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*, Thirteenth Report, 89th Cong. 1st Session, House Report No. 445, June 4, 1965, p31.

¹⁸³ Cited in John B. Hungerford, Jr., Major, USAF, *Organization for Military Space - A Historical Perspective*, Air Command and Staff College Report No. 92-1235 (Maxwell AFB, AL, 1982), 26.

The Joint Chiefs of Staff (JCS) opposed this and opposition to ARPA's creation was one of the few things the Army, the Air Force and the Navy could agree on. The Air Force's Deputy Chief of Staff for Development commented concerning the earth satellite and other space vehicles. "In my opinion the national interest would best be served by a firm decision assigning these two mission responsibilities to one military service. I believe the Air Force should receive confirmation that both areas are within its purview of mission assignment."¹⁸⁴ But McElroy overruled them all. Eisenhower even included the pending ARPA creation in his January 9, 1958 State of the Union address: "In recognition of the need for single control in some of our most advanced development projects, the Secretary of Defense has already decided to concentrate into one organization all anti-missile and satellite technology undertaken within the Department of Defense."¹⁸⁵

Congress passed the legislation funding ARPA, PL 85-325, on February 12, 1958 and it authorized the Secretary of Defense to "engage in such advanced projects essential to the Defense Department's responsibilities in the field of basic and applied research and development which pertain to weapons systems and military requirements. . . . and for a period of one year from the effective date of this Act, the Secretary of Defense or his designate is further authorized to engage in such advanced space projects as may be designated by the President."¹⁸⁶ Therefore ARPA was, in fact, America's first space agency, starting operations in February 1958, whereas NASA began functioning in October 1958. Nevertheless, Congress clearly limited ARPA's funding and authority over civilian space projects to one year because, as a later Congressional report explained, ARPA was an "emergency measure to provide coordination and leadership . . . for space projects already underway or envisioned within the Defense Department. ARPA was our only attempt at giving immediate direction to the space effort on a fairly high level. It came also as a response to a feeling that the far-ranging space exploration projects were hard to reconcile with indi-

¹⁸⁴ Lieutenant General Donald Putt. Memorandum for Chief of Staff, USAF. Subject: Comments Relative to Special Projects Agency, November 22, 1957, K168-8636-25, AFHRA, 1. Emphasis in original.

¹⁸⁵ Cited in Griffith, 11.

¹⁸⁶ Public Law 85-825, Advanced Research Projects Agency, February 12, 1958, SPI document 1541, section 7, p. 4.

vidual services' missions. At the time of its founding, plans for a civilian space agency were already developing."¹⁸⁷ Eisenhower also emphasized ARPA's conditional nature when he authorized the transfer of all military and scientific space projects to ARPA on March 24, 1958 but "... with the understanding that when and if a civilian agency is created, these projects will be subject to review to determine which would be under the cognizance of the Department of Defense and which under the cognizance of the new agency."¹⁸⁸ Eisenhower's Staff Secretary summarized ARPA's purpose: "... we simply had to get above this very difficult situation involving the services. You see, if you were dependent on the services that meant you were going to be affected and afflicted by this rivalry rather than having an agency which would go at the problems from a national point of view."¹⁸⁹

ARPA's period of importance in space was from its founding in February of 1958 until September 1959. Until NASA stood up in October 1958 ARPA had managerial responsibility for all of America's space programs, from Vanguard to the Air Force's reconnaissance satellite. It should be noted, however, that in most cases ARPA immediately contracted the projects back to the original organization for execution, so the Air Force continued to develop the WS-117L and the NRL continued to conduct the Vanguard program. Nevertheless, the services resented losing the final say in their space projects and felt ARPA posed the danger of evolving into a fourth service.

By September 1959 ARPA's space project responsibilities were transferred back to the services and ARPA faded from importance in the civil-military field. Until that point, the Air Force had to contend not only with the increasing power of, and possible bureaucratic competition with, the new civilian space organization NASA, but also with ARPA as another layer of OSD bureaucracy. ARPA's role as the OSD supervisor for space R&D would fade in 1959 but the new Director of Defense for Research and Engineering (DDR&E) took it over and continued to exercise tight control over Air Force space projects

¹⁸⁷ Congress, House, Select Committee on Astronautics and Space Exploration, *The National Space Program*, Report, 85th Congress, 2nd Session, May 21, 1958, p. 9.

¹⁸⁸ Eisenhower, memorandum for the Secretary of Defense, March 24, 1958, K140.11-11, AFHSO, 1.

¹⁸⁹ Goodpaster oral history interview, July 22, 1974, *supra*, 31.

throughout the 1960s.¹⁹⁰ USAF officers such as Schriever would repeatedly assert, "The services were under proper supervision at the OSD level, we didn't need an ARPA. We were doing that kind of work."¹⁹¹ Before ARPA was even official, Schriever had said, "... any program to establish a separate astronautics management agency would result in duplication of capabilities already existing in the Air Force ballistic missile programs at a cost in funds and time. . . ."¹⁹² Strict OSD-level supervision, through ARPA and later DDR&E, was a reality with which the Air Force had to learn to live, just as they would have to share the playing field with NASA in a few months. One of the consequences of the creation of ARPA and pending creation of NASA was that by the summer of 1958, "... the identity of the well-thought-out Air Force space program had been lost."¹⁹³

Dividing the Indivisible?

Eisenhower's space for peace policy had been emerging since early 1955 and culminated with the submission of his administration's version of the Space Act on April 2, 1958. Before returning to the discussion of the Space Act at the point at which Eisenhower had submitted his version to Congress, one

¹⁹⁰ The muddled organizational situation of late 1958 and 1959 was a result of PL 85-599, August 6, 1958, the Defense Reorganization Act, which created yet *another* OSD bureaucracy, the Director of Defense Research and Engineering (DDR&E) to supervise all DoD research, development, technical and engineering activities. For a reprint of this bill see Congress, House, Committee on Science and Astronautics, *Defense Space Interests*, Hearings, 87th Congress, 1st Session, March 1961, p. 219ff. There was a period of some confusion concerning whether Roy Johnson as ARPA Director was subordinate to or superior to the first DDR&E Herbert York (whose previous job had been ARPA Chief Scientist, serving under Roy Johnson). Finally, in 1959 Deputy Secretary of Defense Quarles declared that Roy Johnson and ARPA "... will be subject to the supervision and coordination of Dr. York's office just as are those of the military departments." See Congress, House, Committee on Appropriations, *Department of Defense Appropriations for 1960*, Hearings, part 6: "Research, Development, Test, and Evaluation," 86th Congress, 1st Session, 1959. DOD Directive 5105.15 of March 17, 1959 officially made ARPA and its projects "subject to the supervision and coordination of the Director of Defense Research and Engineering." See Bowen, *An Air Force History of Space Activities*, 176. From this point, the ARPA Director was no longer the voice of the Secretary of Defense in space research and development matters, the DDR&E was.

¹⁹¹ Oral history interview of General Bernard A. Schriever by the author, July 2, 1996.

¹⁹² Cited in Futrell, *volume 1*, 590.

¹⁹³ Bowen, *An Air Force History of Space Activities*, 142. Bowen explains that when Boushey's Directorate for Advanced Technology began operations on July 15, 1958, the Air Force space program it directly supervised consisted of seven studies on possible programs such as a manned reconnaissance system, a lunar observatory, a satellite interceptor, and a 24-hour reconnaissance satellite. The USAF did not launch a space vehicle until Project SCORE in December 1958.

philosophical point merits attention. Was it even possible to rationally accomplish one important component of the space for peace policy, the separation of the United States space program into distinct civilian and military components? Eisenhower's Budget Director Maurice Stans told Congress during its Space Act hearings that the President will simply have to assign many projects in a gray area between NASA and the DoD to one organization or the other because the BoB "... has found it almost impossible in legislation to establish precise division between agencies with closely related programs. I don't think it can be done here."¹⁹⁴

Space policy analyst Eilene Galloway provided the most cogent analysis of this question to the congressional committees considering Eisenhower's Space Act in her reports, "Problems of Congress in Formulating Outer Space Legislation," March 7, 1958, and "Reasons for Confusion About Space Law," May 11, 1958. In the former she pointed out, "The line between the peaceful and military uses of outer space is much more difficult to draw than is the case with atomic energy. . . . Practically every peaceful use of outer space appears to have a military application," such as weather, communication, reconnaissance, even biomedical research. "We can establish civilian control within the United States, but if it turns out that peaceful uses cannot be scientifically separated from military implications, then how are we to regulate the international civilian-military situation?" She asked, "Upon the basis of what scientific facts can a line be drawn between military and non-military outer space activities?" She concluded, "It will be a difficult legislative task to devise a law for the effective organization and administration of these far-flung operations in which the military and non-military are so closely associated."¹⁹⁵

In the latter she reiterated, "The fact that the satellite as an instrument is practically indivisible as between military and civilian use has not been stressed, with the result that some people are trying to divide things which cannot be divided without increasing the cost beyond necessity." She warned against the tendency to characterize the DoD as 'military' and the soon-to-be NASA as 'civilian' because the DoD

¹⁹⁴ Congress, Senate, Special Committee on Space and Astronautics, *National Aeronautics and Space Act*, Hearings, 85th Congress, 2nd Session, 1958, 282.

¹⁹⁵ Eilene Galloway, "Problems of Congress in Formulating Outer Space Legislation," March 7, 1958, reprinted in House Select Committee, *Astronautics and Space Exploration*, 8-9.

was in fact under civilian control and NASA's predecessor the NACA spent much of its time on military matters:

The fact to emphasize is that both ARPA and NASA are scientific. . . . The fact that one scientist wears a uniform while his co-worker wears a civilian suit does not mean that the uniformed scientist is an incipient Napoleon who threatens popular government. . . . control by a group of scientific specialists is just as dangerous to democratic government as control by a group of military specialists. [The important point is the] concept of control of policy by the elected representatives of the people over the various professional specialists who lack the breadth of vision required for guarding the common welfare and the public interest. . . . The main reason we must have a civilian agency in the outer space field is because of the necessity of negotiating with other nations and the United Nations from some non-military posture. . . . If all we wanted to achieve was maximum efficiency at minimum cost in a satellite program, we could leave it all in ARPA as presently constituted."¹⁹⁶

The committees reprinted Galloway's sentiments in their final reports. The House members were convinced that ". . . it is extremely difficult to separate scientific discoveries directly applicable to the military from those most important to peaceful uses. Discovery is impartial and impersonal. It can be controlled by no blueprint. It can be contained by no laws. . . . the job of a space agency is to turn a sword into something of a cosmic plowshare."¹⁹⁷

Galloway's points are very helpful in sorting out the October 1957 to October 1958 time frame, especially the role of Congress. Even though it might not be possible to perfectly categorize all potential space projects as either civilian or military in nature, the international nature of space in a cold war context made at least the attempt necessary. Further, the real concern was not reining in a corps of out of control Colonel Blimps but rather ensuring that America's elected representatives, including the President, maintained firm control over all parties who might want to use the American space program for their own agenda.

The Congressional Role in Balancing Civil-Military Responsibility

Returning to the Space Act, there were in fact four Space Acts: Eisenhower's submission to Congress on April 2, 1958, the separate versions passed by the House and Senate, and the final version

¹⁹⁶ Eilene Galloway, "Reasons for Confusion About Space Law," May 11, 1958, folder: National Aeronautics and Space Act of 1958, box: White House, Presidents, Eisenhower, Space Act, NHDRC, 1-4. Emphasis in original.

¹⁹⁷ Congress, House, Select Committee on Astronautics and Space Exploration, *The National Space Program*, House Report No. 1758, 85th Congress, 2nd Session, May 21, 1958, 3, 5.

crafted by a conference committee which Eisenhower signed on July 29, 1958. Fortunately, they agreed on all the points relevant to this dissertation except one, the exact wording dividing responsibility for space projects between NASA and DoD and how to effect subsequent coordination of effort on space projects. The relevant points of agreement require little discussion except to point them out. First, there was consensus that United States space activities “. . . should be devoted to peaceful purposes for the benefit of all mankind.” Second, there was agreement on the fact that “. . . such activities shall be the responsibility of, and shall be directed by, a civilian agency exercising control over aeronautical and space activities sponsored by the United States, except. . . .” (the language following “except” was the problem area). Third, there was agreement on the general objectives for United States space activities, to include: expanding human knowledge; studying the potential benefits of space vehicles; preserving “the role of the United States as a leader [not the leader] in aeronautical and space science and technology;” “making available to agencies directly concerned with national defenses of discoveries that have military value or significance;” and cooperating with other nations in space.¹⁹⁸

Eisenhower’s version of the “exception clause” (phrase used to describe the fact that all space activities were to be given to NASA *except* certain ones) read, “except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense.”¹⁹⁹ This language, and the discussions in the Eisenhower administration preceding its version of the Space Act, led many officials within the DoD to conclude the proposed NASA would simply be an extension of and expansion upon the old NACA, and organization with which the DoD and Air Force were very comfortable and had a cozy relationship (see chapter 2, final section). When it became clear during the subsequent Congressional hearings that NASA was in fact to be not only a research agency but also an operating agency, the DoD

¹⁹⁸ National Aeronautics and Space Act of 1958, reprinted in John M. Logsdon, w/Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 335.

¹⁹⁹ Congress, House, Committee on Science and Astronautics, *Legislative History of the Space Law of 1958 Establishing the World’s First Civilian Space Agency: A Detailed Documentation of the Enactment by Congress of a New Law*, Report, 86th Congress, 2nd Session, August 1960, 18.

would become much more concerned with the exception clause cited above. But in early April Deputy Secretary of Defense Donald Quarles concluded that the NASA would be a "logical extension" of the NACA and stated, "It is assumed the operation of the new agency would bear the same relationship to the Department of Defense . . . as the NACA now does in the aeronautics field, and specifically, that NASA would continue to perform aeronautical research that is basic to military aeronautics."²⁰⁰

Some DoD officials displayed these assumptions during the congressional hearings on the Space Act between April 15 and May 12, 1958 in the House and May 6-8, 13-15 in the Senate. ARPA Director Roy Johnson stated the DoD felt its relationship with NASA would be ". . . basically an extension of the relationship with NACA as it existed in the past and there was not much concern about the language or the change in relationship."²⁰¹ The USAF's top R&D officer believed NASA "should perform almost the same role across the board" as had the NACA "with all the agencies of the Government in essentially the same manner and the same method that has been practiced in the past. . . . So I view their role and relationships as just remaining practically the same except extending in scope from conventional aeronautics into space. It would seem to me that NASA would still function in an advisory capacity in the same way that they have in the past." Assistant Secretary of Defense for R&D Clifford Furnas, when asked if DoD thought the new NASA would be an operating agency responded, "It will not be an operational agency. It is strictly a research and development agency." Even James Doolittle, the NACA Chairman said, "I see no change in relationship between the military services and the NACA as a result of the establishment of the NASA."²⁰² The bulk of the congressional hearings on Eisenhower's Space Act are the story of how this DoD perception changed and the resulting modification of the exception language.

Since the termination of the Preparedness Subcommittee's inquiry in January 1958, Congress had been waiting for the White House to submit legislation so it could resume its active role. When the president's proposals arrived on April 2, both houses had previously established new standing committees

²⁰⁰ Donald Quarles, letter to BoB Director Maurice Stans, April 1, 1958, K168.8636-23, AFHRA. 1.

²⁰¹ Senate Special Committee, *National Aeronautics and Space Act*, 168.

²⁰² House Select Committee, *Astronautics and Space Exploration*, 131-32, 767, 930.

(for the first time since 1946²⁰³) to deal with the issue of space. In fact, both houses felt America's organizational response to Sputnik was so important that the Majority Leaders were selected to chair each committee: Senator Lyndon Johnson (D-Texas) and Representative John McCormack (D-Mass.) Very senior congressmen were selected as additional members for the new committees.

On February 6, 1958 the Senate created its Special Committee on Space and Astronautics; the House followed on March 5 with its Select Committee on Astronautics and Space Exploration. Rhetoric dominated both occasions, with Johnson declaring, "The exploration of outer space will dominate the affairs of mankind, just as the exploration of the Western Hemisphere dominated the affairs of mankind in the 16th and 17th centuries. . . ." ²⁰⁴ Since the House had lesser institutional experience with space issues (the Senate having conducted the Preparedness hearings), its Select Committee met for 17 days between April 15 and May 12 to call 48 witnesses. Given that the Senate had previously dealt with much of the technical information, its Special Committee confined its hearings more narrowly to Eisenhower's bill and therefore met for six days between May 6 and May 15, calling only twenty witnesses. While both committees were reacting to the same bill, the House seemed concerned that the DoD would have too *much* power in the space arena while the Senate questioned whether or not the DoD would have too *little* say in space R&D and operations. But in both houses the question of the proper balance of civilian vs. military control in America's space effort was a key issue.

No one who testified before the committees questioned the fundamental wisdom of civilian control. Questions concerned, on the one hand, the particular balance of power that might exist between NASA and the DoD given various permutations of the except clause highlighted above. On the other hand, there was also a great deal of concern that the two agencies properly coordinate their activities to ensure America had as rational a program as possible with little duplication. On this second point, the House tended to favor a relatively large Military Liaison Committee that would meet at the agency level to ensure programs and projects were properly coordinated. The Senate preferred a National Space Council similar to the NSC that would involve fewer but higher-ranking members such as the Secretary of De-

²⁰³ According to McDougall, 169.

²⁰⁴ Cited in *Legislative History of the Space Law*, 3.

fense. Secretary of State. NASA Administrator, etc., to provide guidance and overall policy direction to America's space program. In a typical bureaucratic compromise, the final legislation created both bodies.

The House's Select Committee's concern was that the bill's tasking language would enable the DoD to control almost all of the space program by declaring that virtually everything was related to military weapons or operations. Again and again Chairman McCormack objected: "You create a civilian situation but then you accept everything that is peculiar to or primarily associated with weapons systems or military operations. That covers everything. . . . Through the word 'except' you take all the powers away from it [NASA] practically unless the Defense Department says it is all right. . . . The Defense Department might hold that the sending up of satellites is primarily military. Then you realize under the terms of the bill the military makes the decisions, does it not, unless we change the language?"²⁰⁵

Most responses to such queries pointed out that like disputes between any two executive branch agencies, such quarrels would ultimately go to the president for resolution. Most, however, could probably be worked out at a lower level, given proper coordination. There was much discussion on exactly how this could best be accomplished with the House preferring a larger committee working on a daily basis at the operating level of the agencies.

DoD personnel, uniformed and civilian, repeatedly urged the House committee members not to accept language that would prohibit the DoD from engaging in R&D or space operations that were considered part of their national security responsibility. A parade of witnesses emphasized, "The bill . . . should not have language in it which says we can only work on things for which there is a well-defined requirement." The DoD had to have the freedom, in their opinion, to engage in very basic exploratory R&D that might or might not lead to militarily useful hardware.²⁰⁶ When they began to realize that NASA would not simply be an advisory R&D organization like the old NACA but would in fact be another agency operating in space on a day-to-day basis, DoD officials emphasized it was ". . . of great importance that the delineation between military and civilian interests be made clearly and justly to avoid

²⁰⁵ House Select Committee, *Astronautics and Space Exploration* 837, 862, 981.

²⁰⁶ Dr. Herbert York, ARPA Chief Scientist, *ibid.*, 40.

jurisdictional disputes.”²⁰⁷ The importance of modifying the exception clause became clear to DoD leaders when civilian scientists began to make statements to Congress such as, “I have the strong feeling that the Department of Agriculture . . . might have more cognizance and basic interest in the research of outer space than Defense, actually.”²⁰⁸ The growing interpretation that the DoD would have to clear its projects through NASA and that NASA would handle a large portion of military space R&D under Eisenhower’s exception language “aroused the DOD to legislative counterattack.”²⁰⁹

Unfortunately, this task of drawing a clear delineation between civilian and military concerns in space was probably impossible in the short term. Officers already experienced in space like General John Medaris, Director of the Army’s Ballistic Missile Agency, explained “. . . neither this bill nor succeeding events can completely define in all cases where the division point is. . . . I find it very difficult in my own mind, with assurance, to divide out the scientific, the peaceful, and the military.”²¹⁰ Therefore the DoD witnesses urged some mechanism for close cooperation, coupled with granting DoD the flexibility to pursue a wide variety of R&D that could lead to national security hardware at some point in the future. “I think any civilian agency that is established should not have an inhibiting influence on the military’s being able to carry out its requirements” was a common sentiment among military witnesses.²¹¹ Most DoD officials would have agreed with Deputy Defense Secretary Quarles in urging “administrative latitude” in working out the NASA-DoD relationship: “I think it has to be both things, and both things in parallel, and both things with priority.”²¹²

Combative ARPA director Roy Johnson bluntly expressed the DoD’s concern:

The legislation setting up a civilian group should not be so worded that it may be construed

²⁰⁷ Rear Admiral John Hayward, Assistant Chief of Naval Operations for R&D, *ibid.*, 274.

²⁰⁸ Dr. James Van Allen, Professor of Physics, University of Iowa, discoverer of the Van Allen radiation belts surrounding the earth, and long-time leader in the astrophysics field. House Select Committee, *Astronautics and Space Exploration*, 864.

²⁰⁹ Schoettle, 242.

²¹⁰ House Select Committee, *Astronautics and Space Exploration*, 144-145.

²¹¹ General Bernard Schriever, director of the Air Force’s ICBM development team, *ibid.*, 627.

²¹² *Ibid.*, 1105.

to mean that the military uses of space are to be limited by a civilian agency. This could be disastrous. It behooves the writers of this legislation to state positively this freedom clearly and without equivocation. . . . if the DoD decides it to be militarily desirable to program for putting man into space, it should not have to justify this activity to the civilian agency.²¹³

ARPA's chief scientist added, ". . . if the Department of Defense wants to put up reconnaissance satellites I don't see why the civilian agency should have anything to say about it."²¹⁴ By the end of the hearings even McCormack was convinced as to the necessity of such language guaranteeing freedom for DoD R&D: "I realize the difficulty of divorcing what is civilian from military, and I think any doubt should be resolved . . . on the side of safety. . . on the side of the military."²¹⁵

Accordingly, the House amending Eisenhower's tasking language. It gave DoD freedom for its R&D and it directed NASA to cooperate with DoD, as opposed to the Eisenhower language which said that NASA may do so. Section 102 of the House's bill said NASA, "shall act in cooperation with (A) the Department of Defense insofar as such activities are peculiar to or primarily associated with weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States. . . ."²¹⁶ While vesting more responsibility in the DoD and mandating cooperation, the House still did not grant the DoD sole responsibility for that part of the space program 'peculiar to or primarily associated . . . ' That would have to wait for the Senate. The House clearly felt this step unnecessary. One of its staff reports stated the House language ". . . makes clear the Space Agency is civilian and free from military domination, yet organized so that neither civilian nor military activities will be slighted or obstructed."²¹⁷ In the House members' minds, the provision for the Military Liaison Committee ensured, through its agency coordinating func-

²¹³ Ibid., 1165.

²¹⁴ Ibid., 1533.

²¹⁵ Ibid., 1172.

²¹⁶ *Legislative History of the Space Law*, 828.

²¹⁷ Congress, House, Select Committee on Astronautics and Space Exploration. *Comparison of H.R. 12575 as passed by the House and as Passed the Senate, June 18, 1958*, Committee Print, 85th Congress, 2nd Session, 1958.

tion. that no slighting or obstructing would take place.

The Senate Special Committee took the final step of enabling the DoD to completely control those aspects of the space program 'peculiar to or primarily associated . . .' DoD officials expressed to the Senate almost exactly the same kind of concerns they had to the House. outlined above. The Senate was initially much more concerned that the civilian agency could inhibit the DoD role in space so the DoD testimony had even more impact in the Senate's proceedings. Quarles reemphasized: the 'peculiar to. . .' language must not "define by exclusion or otherwise the proper activities of the Department of Defense. . . . I would construe this language as not limiting the clear responsibility of the Department of Defense for programs that are important to the defense mission, including the support of research that is closely related to the defense mission."²¹⁸ He recommended clear language tasking the DoD as the responsible agent for such activities. ARPA's Roy Johnson explained that the DoD was ". . . certain that a high order of cooperation must exist if the national program is to be accomplished. . . . I believe what is really important here is that the Department of Defense not be precluded from going into a scientific exploration for defense reasons. . . ."²¹⁹ In other words, the DoD should be able to pursue programs "it believes have a reasonable chance of fulfilling military ends without having a civilian agency say yes or no."²²⁰ A string of uniformed officers made the same points.

Senate Special Committee members on both sides of the aisle seemed more than amenable to this train of thought. A Republican from Iowa believed the military aspects might be placed at risk of being ". . . deteriorated under perhaps certain imagined or possible civilian attitudes"²²¹ under Eisenhower's tasking language. The ranking minority member suggested the language "must be tied closer to the military than is now proposed in the bill I am for this space exploration, but the primary purpose of it . . . is the defense of the country."²²² Democrat Theodore Greene concurred and concluded concerning the

²¹⁸ Senate Special Committee, *National Aeronautics and Space Act*, 67.

²¹⁹ *Ibid.*, 147-148.

²²⁰ *Ibid.*, 178.

²²¹ *Ibid.*, 24, Senator Bourke Hickenlooper.

²²² *Ibid.*, 73-74, Senator Styles Bridges, New Hampshire.

Eisenhower bill's tasking language. "The whole sentence needs rewriting."²²³ In fact Johnson's final committee report, forwarded to the Senate as a whole, pointed out "Your committee believes great mischief could be wrought by delegating to the civilian Space Agency authority over military weapons systems and military operations." Therefore the committee had rewritten the bill's language based upon its "universal recognition that the proposed legislation should not restrict or hamper the Department of Defense. . . . [because] the military aspects of the problem are grave, involving as they do the very survival of the nation."²²⁴ Johnson emphasized in the Congressional Record that his intention was to say to the DoD: "You shall have complete responsibility for those aeronautical and space activities primarily associated with research into and development of our weapons systems and with military operations, both in peacetime and wartime." At the same time, "There is no dispute here as to whether we shall have civilian or military control over our aeronautical and space activities. That control will clearly be civilian."²²⁵

The Senate's modifications were two-fold. First it ensured coordination via a limited-in-size and high ranking Space Policy Board described above. Second and more important it tightened up the tasking language. It said America's space program shall be the responsibility of, and directed by, a civilian agency "except that activities peculiar to or primarily associated with the development of weapons systems or military operations shall be the responsibility of, and shall be directed by, the Department of Defense."²²⁶ Both the DoD and BoB expressed approval of this wording.²²⁷

The Eisenhower administration seemed amenable to either the House or Senate language, or

²²³ Ibid., 239, Senator from Rhode Island.

²²⁴ Congress, Senate, Special Committee on Space and Astronautics, *National Aeronautics and Space Act of 1958*, Report No. 1701, 85th Congress, 2nd Session, June 11, 1958.

²²⁵ Volume 104, No. 98 for June 16, 1958, reprinted in *Legislative History of the Space Act*, 1107.

²²⁶ Copy of the Senate Special Committee's bill S. 3609 dated June 11, 1958, page 18, lines 9-12. NHDRC.

²²⁷ Congress, Senate, Special Committee on Space and Astronautics, *S. 3609: A Bill Establishing a National Aeronautics and Space Agency, with a Section by Section Analysis and Staff Explanation and Comments*, Confidential Committee Print, 85th Congress, 2nd Session, May 31, 1958, p. 2.

some compromise version. The White House only insisted that the Space Policy Board not usurp presidential power. Initially it appeared reconciling the House and Senate versions could be quite difficult. The House was worried that under the Senate's language the DoD would have full responsibility over military space; this "could prevent effective planning of the national space program and critically hamper its coordination. . . . The Department of Defense would have the controlling voice in determining what were military and what were civilian space activities."²²⁸ The House preferred its language because, coupled with its Military Liaison Committee, it felt there would be "a continuous two-way street of information and decision-making."²²⁹ The full House did not modify its committee's bill and unanimously passed it by voice vote on June 2 after only two hours of debate dealing with issues such as patents and salary levels.

The Senate remained committed to its version as the best balance of guaranteeing civilian control while taking care ". . . to insure that the Department of Defense and the military services have the necessary authority and responsibility to carry out those programs and projects which are needed to maintain military security."²³⁰ It remained committed to a high-level Space Policy Board that would go beyond the advisory function envisioned by the House and actually craft America's space program: by means of this process proper civil-military cooperation and coordination would occur. The Senate version of the bill passed that body unanimously by voice vote on June 16.

Despite initial pessimism, the differences between the bills were resolved in late June and early July 1958. One participant cites the willingness of the White House to participate in the discussions as key to the resolution of differences.²³¹ By early July the only remaining difficulty was Johnson's insistence on a strong Space Policy Board while the White House remained concerned over a possible diminu-

²²⁸ *Comparison of H.R. 12575, 1-2.*

²²⁹ House Select Committee, *The National Space Program*

²³⁰ Congress, Senate, Special Committee on Space and Astronautics, *Final Report*, Report No. 100, 86th Congress, 1st Session, March 11, 1959, p. 6.

²³¹ Hechler explains in *Endless Frontier*, 21, that the liaison between Bryce Harlow, Eisenhower's Deputy Assistant for Congressional Affairs, and the House Select Committee's Administrative Assistant Edward A. McCabe greatly facilitated the compromising process.

tion of presidential authority. The final piece of the puzzle fell into place on July 7 when Johnson visited Eisenhower in the White House. Johnson suggested that perhaps the impasse could be broken if the president was designated the Policy Board's chairman and the Board thus functioned similarly to the National Security Council. Eisenhower said he felt that would work and agreed to what would become known as the Space Council.²³²

In the end a House-Senate conference committee required only a single day, July 15, 1958, to draft a final version of the National Aeronautics and Space Act. McCormack agreed to Johnson's Space Council and the Senate's tasking language more friendly to the DoD; in return Johnson agreed to the House's Military Liaison Committee and backed away from his insistence on a joint Senate-House standing space committee (both houses would establish standing space committees.) The final version of the bill passed both houses of Congress by unanimous voice votes on July 16, 1958 with no debate and no amendments.

The Final Product

The tasking language of PL 85-568, the Space Act, which Eisenhower signed on July 29, 1958, still contained the House's R&D proviso but overall was a victory for the Senate's interpretation. NASA then and now exercises control over, has responsibility for, and directs U.S. aeronautical and space activities

except that activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States) shall be the responsibility of, and shall be directed by, the Department of Defense; and that determination as to which such agency has responsibility for and direction of any such activity shall be made by the President . . .²³³

²³² This meeting is described in Glen Wilson's "How the Space Act Came to Be" in the Space Policy Institute's *The Legislative Origins of the Space Act*; in Lyndon Johnson, *The Vantage Point: Perspectives of the Presidency, 1963-1969* (New York: Holt, Rinehart, and Winston, 1971), 277; and in Killian, *Sputnik, Scientists, and Eisenhower*, 137. Primary source is memorandum for record, no author. Off the Record Meeting between the President and Senator Lyndon Johnson, July 7, 1958, box 35, DDE Diary Series. Ann Whitman file, DDEL. 1.

²³³ Section 102.b, PL 85-568, National Aeronautics and Space Act of 1958, reprinted in *Exploring the Unknown, Volume I*, 335.

The House-Senate conference report explained the common ground. Both agencies were afforded the necessary freedom to fully develop their respective peaceful and defense uses to avoid delay and to "exclude the possibility that one agency would be able to preempt a field of activity so as to preclude the other agency from moving along related lines of development. . . . However, because there is a gray area between civilian and military interests, and unavoidable overlapping, it is necessary that machinery be provided at the highest level of Government to make determinations of responsibility and jurisdiction."²³⁴ NASA thus came into existence on October 1, 1958 with only a very general framework elucidating its role, mission, and particular responsibilities. The specific division of projects and programs would take place over the next few years by means of bureaucratic give and take. Sometimes the process of division would be mutually agreed upon, sometimes the decisions created a measure of hostility.

The Space Act created two organizations designed to facilitate NASA-DoD coordination. The National Aeronautics and Space Council's (NASC) charter was ". . . to advise the President with respect to the performance of the duties" prescribed elsewhere in the Space Act and summarized above.²³⁵ It could, therefore, become involved in disputes arising between the DoD and NASA. The second organization was the Civilian-Military Liaison Committee (CMLC). The CMLC's tasking was to provide a forum for NASA and the DoD to "advise and consult with each other on all matters within their respective jurisdictions relating to aeronautical and space activities and shall keep each other fully and currently informed with respect to such activities."²³⁶ The CMLC never achieved any measure of effectiveness because the appointed members had no authority in either NASA or the DoD and so could be bypassed with

²³⁴ House of Representatives, 85th Congress, 2d Session, *National Aeronautics and Space Act of 1958*, Report No. 2166, Conference Report (Washington, D.C.: July 15, 1958), 16.

²³⁵ National Aeronautics and Space Act of 1958, Section 201, reprinted in *Exploring the Unknown, Volume I*, 336. The NASC's members were: the President, Secretary of State, Secretary of Defense, NASA Administrator, AEC Chairman, one other federal government member appointed by the President, and three other members from the civilian community appointed by the President. Eisenhower acceded to the NASC's creation only to facilitate passage of the overall Space Act. During the remainder of his term he refused to hire any staff for it and it met only irregularly.

²³⁶ *Ibid.*, section 204. The CMLC's members were: a chairman appointed by the President, one or more representatives from the DoD and one or more representatives from the military services selected by the Secretary of Defense, and an equal number of total representatives from NASA and appointed by the NASA Administrator. The numbers were not fixed.

impunity.

Congress demonstrated its greater inclination to regard space as a competitive tool in the cold war struggle. The House reported stated, "The United States must leapfrog these Soviet accomplishments. This will take some years, and will require a genuine mobilization, on a national scale, of the vast scientific and technical capabilities of this country."²³⁷ Another House document said the "... direct connection between science and the world power struggle will be appreciably extended by the race into space. It is a race, no matter how sincerely we long for some form of viable international cooperation. And it will be viewed as such by the eyes of the world."²³⁸ Senate reports contained similar sentiments. Concluded one pair of scholars, "There can be no question that for the moment the overriding concern within and outside the Congress was to get the United States in a position to *compete* effectively with the USSR."²³⁹

The Space Act enshrined the concepts of a dual civil-military space program and of overall civilian control with adequate leeway for DoD to conduct R&D in space technology related to America's national defense. A Senate report could simply note, "The essentiality of civilian control is so clear as to be no longer a point of discussion." At the same time, "There is universal recognition that the ... legislation should not restrict or hamper the Department of Defense in conducting its aeronautical and space activities which are vital to national security. ... Each will maintain its own sphere of primary interest, but necessarily there will be areas within which those separate interests overlap."²⁴⁰

This is not to say all members of the military were entirely happy with the outcome. Schriever boldly states, "I was very much opposed to the organizational arrangements right from the very beginning. NACA should never have been disturbed. Creating NASA was an unnecessary creation of an organization." Schriever said the government simply "took the military, put them over in NASA and started the

²³⁷ Congress, House, Select Committee on Astronautics and Space Exploration, *Establishment of the National Space Program*, Report No. 1770, 85th Congress, 2nd Session, May 24, 1958, p. 4.

²³⁸ House Select Committee, *The National Space Program*, 4.

²³⁹ Dodd L. Harvey and Linda C. Ciccoritti, *U.S.-Soviet Cooperation in Space* (Miami, FL: Monographs in International Affairs, Center for Advanced International Studies, 1974), 36. Emphasis in original.

²⁴⁰ Senate Special Committee, Report No. 1701, *supra*, 4.

manned spaceflight program. They would've done much better had they allowed the military to carry out the operational type of flying. We proved that we could do it. We had our people running the programs. Eisenhower was sold a bill of goods by Jim Killian."²⁴¹ The Vice Chief of Staff of the Air Force at the time of NASA's creation, General Curtis LeMay, agreed: "We made a costly error when we formed NASA. The Air Force had a good relationship with NACA. NACA did basic research and knew what we wanted. When NASA was formed, it expanded from basic research to an operating organization. It had no management talent."²⁴²

But the die was cast. NASA was a reality and the DoD, and the Air Force, would have to forge some kind of working relationship with it. NASA had powerful congressional allies who were proud of their creation and would serve as powerful checks on any perceived DoD/USAF hegemony. Lyndon Johnson looked back on his entire political career and the "dozens and dozens" of laws he sponsored and concluded, "There is not a single one that gives me more pride than the Space Act."²⁴³ Certainly one could quarrel with portions of the civil-military balance struck by the Space Act, maintaining it "sewed as many snarls as stitches in the fabric of American government"²⁴⁴ or that it "... would mark only the beginning of the fight to ensure full civilian control over the nation's space program."²⁴⁵ There is a degree of legitimacy in both charges. But Eisenhower and the 85th Congress did remarkably well in creating an organization structure that tried to provide guidance as to the proper civil-military split in the American space program without unduly restricting the organizations' freedom of action. Perhaps the Space Act achieved a more important, though large unspoken, balance between creating an aura of space for peaceful purposes as the dominant impression characterizing the US space program while still insuring that the quest for operational reconnaissance satellites could continue unimpeded.

²⁴¹ Oral history interview of Schriever, July 2, 1996, by the author.

²⁴² Oral history interview of General Curtis LeMay, January 1965, K239-0512-714, AFHRA, 7.

²⁴³ Lyndon Johnson, Remarks at a Dinner Honoring Members of the Space Program, December 9, 1968, *Public Papers of the President, 1968-69* (Washington, DC: USGPO, 1970), 1174.

²⁴⁴ McDougall, 176.

²⁴⁵ Divine, *Sputnik Challenge*, 112.

As one perceptive analyst has stated, "The golfer actually [Eisenhower] knew a great deal more than he was letting on."²⁴⁶ Though one can say he did fail to appreciate the psychological vulnerability of the American people and their panicked reaction to Sputnik. Eisenhower did succeed in resisting the more egregious calls for dramatic increases in all sorts of federal expenditures, most particularly defense. When he was repeatedly accused of permitting a dangerous missile gap to develop, as evidenced by Sputnik, Eisenhower knew through U-2-provided intelligence that this was not the case and so, "Ike took the heat, grinned, and kept his mouth shut."²⁴⁷ While he did permit the creation of a new civilian space agency that he perhaps had not originally supported, he ensured the Space Act protected his fundamental space policy. Beyond NASA's creation, Eisenhower refused to sanction major increases in federal expenditures. As a result, his biographer has concluded, "Eisenhower's calm, common-sense, deliberate response to Sputnik may have been his finest gift to the nation, if only because he was the only man who could have given it."²⁴⁸ The next two chapters will detail how Eisenhower continued to rein in, first, the impulses for a prestige-oriented space race with the USSR, an action which gave a particular cast to the NASA-DoD relationship, and second, the calls for a massive human spaceflight program that can be considered a subset of the calls for a prestige-oriented space race.

²⁴⁶ Burrows, 90.

²⁴⁷ Senator Barry Goldwater, cited in Divine, *Sputnik Challenge*, 41.

²⁴⁸ Ambrose, 435.

4. Eisenhower's Philosophy in Action II: Forging a NASA-DoD Relationship

In every instance relative to the activities that came under the purview of NASA, a unique confluence of political necessity, personal commitment and activism, scientific and technical ability, economic prosperity, and public mood made possible the policy decisions required to carry out any space program. . .¹

However deplorable one may find it, the first steps in space travel were a product or by-product of the Cold War and the arms race. . . . space travel began when it did, and how it did, as part of a great world conflict.²

Personally, I believe we are in an across-the-board competition with the Soviet Union. Space is the most glamorous of the areas of competition. . . . [But] we have little or no chance to score for several years. We cannot and should not withdraw from the competition - we can only plow ahead on a determined course until we acquire the high thrust rockets we so badly need.³

The hallmark of Eisenhower's handling of space policy was his stolid resistance to demands that the United States embark on crash programs to compete with the Soviet Union.⁴

The President began to talk with much feeling about how he had concentrated his efforts the last few years on ending the cold war, how he felt that he was making big progress, and how the stupid U-2 mess had ruined all his efforts. He ended very sadly that he saw nothing worthwhile left for him to do now until the end of his presidency.⁵

Everything that Kennedy profited by was started by Eisenhower.⁶

¹ Roger D. Launius, "Early U.S. Civil Space Policy, NASA, and the Aspiration of Space Exploration," in Launius, editor, *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, American Astronautical Society History Series, vol. 18, (San Diego, CA: Univelt, Inc., 1996), 63.

² Alan J. Levine, *The Missile and Space Race* (Westport, CT: Praeger, 1994), vii.

³ NASA Administrator T. Keith Glennan, Memorandum to NASA leaders, January 2, 1960, folder: Chronological January 1960, Glennan subseries, Administrators series, NHDRC, 5.

⁴ Fred Greenstein and David Callahan, chapter 1, "The Reluctant Racer: Dwight D. Eisenhower and United States Space Policy," in the pending Roger D. Launius, editor, *The Myth of Presidential Leadership* (Urbana, IL: University of Illinois Press).

⁵ George B. Kistiakowsky, recalling a July 23, 1960 meeting with Eisenhower, in *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology*, (Cambridge, MA and London: Harvard University Press, 1976), 375.

⁶ NASA Deputy Administrator Hugh Dryden, oral history interview of, September 1, 1965, Folder: Dryden, Mercury Tape, Dryden subseries, Deputy Administrators series, NHDRC, 87.

This chapter will examine the institutional climate that existed between NASA and the DoD for the 27 months remaining in Eisenhower's term after NASA began operations on October 1, 1958. To understand this organizational relationship, however, it is necessary to revisit the larger issues of Eisenhower's philosophy and the cold war environment. In addition, the particular beliefs of the Air Force concerning the necessary level of effort in space and the resulting tension with its civilian supervisors in the OSD are integral parts of the NASA-DoD relationship in the Eisenhower administration and later.

The first "big picture" factor is Eisenhower's beliefs concerning participation in a competitive race with the Soviet Union for prestige using space exploration as a tool. The previous chapter explained how prior to NASA's creation Eisenhower was generally against this concept, but did not totally rule out certain competitive projects. This principle held true during the balance of his term, as he did authorize development of the large Saturn rocket for what can only be surmised were prestige-related reasons. Chapter 5, the final "Eisenhower" chapter and the one focusing on human spaceflight, will make clear that human spaceflight was *not* an area he regarded as legitimate for prestige-related competition.

To Compete with the Soviet Union?

Prestige

The policy document issued in the summer of 1958 to bring some sense of order to the rapidly changing field of space exploration was NSC 5814/1. It declared, "The USSR, if it maintains its present superiority in the exploitation of outer space, will be able to use the superiority as a means of undermining the prestige and leadership of the United States and of threatening U.S. security." Space exploration had "an appeal to deep insights within man which transcend his earthbound concerns" and result in a tendency "to equate achievement in outer space with leadership in science, military capability, industrial technology, and with leadership in general." If the United States does not have some type of comparable advance in space, this condition "may dangerously impair the confidence of . . . peoples in U.S. over-all leadership." NSC 5814/1 continued, "To be strong and bold in space technology will enhance the prestige of the United States among the peoples of the world and create added confidence in U.S. scientific, tech-

nological, industrial and military strength.”⁷ This did not mean the United States must launch numerous crash space projects designed to foster prestige. On the contrary, the United States should “. . . judiciously select projects for implementation which, while having scientific or military value, are designed to achieve a favorable world-wide psychological impact” and also develop information programs “to counter the psychological impact of Soviet outer space activities and to present U.S. outer space progress in the most favorable comparative light.”⁸

Eisenhower had a significant challenge in resisting congressional calls for project-by-project race with the Soviets. The Soviets achieved the first satellite to escape earth’s orbit with Luna I on January 2, 1959, the first lunar impact with Luna II on September 12, 1959, and the first photographs of the moon’s far side with Luna III on October 4, 1959.⁹ These types of “spectacular firsts” led House Majority Leader John McCormack to declare the United States faced “national extinction.” Senator John Stennis added, “We can expect to be spending billions of dollars a year on various types of space vehicles unless there is a drastic change in the world situation.” In March 1959 the Senate voted 91-0 to authorize \$27.6 million to expand space research and \$20.7 million to accelerate Project Mercury.¹⁰

NASA Administrator T. Keith Glennan expressed the Eisenhower administration’s position: “To get into a race with Russia and operate our space program solely because we think they are going to

⁷ NSC 5814/1, Preliminary U.S. Policy on Outer Space, August 18, 1958, SPI document 87, p. 1-2. *Exploring the Unknown, Volume I*, 361, reprints only the changes 5814/1 made to NSC 5814 of June 1958. NSC 5814 is reprinted in on pages 345-359. The Eisenhower administration’s final space policy document was written and coordinated as NSC 5918 but approved and issued by Eisenhower on January 26, 1960 as an NASC document, “US Policy on Outer Space.” It does not modify in any significant way the prestige-related sections of NSC 5814/1. For “US Policy on Outer Space,” see SPI document 92, mostly but not completely reprinted in *Exploring the Unknown, Volume I*, 362-373.

⁸ Ibid., 20.

⁹ “Council [NASC] Compiles List of Space ‘Firsts,’” *Aviation Week and Space Technology* (May 16, 1966): 100. Another term often used to refer to the first generation series of Soviet lunar satellites is “Lunik”.

¹⁰ Cited in Derek W. Elliott, *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963*, Ph.D. dissertation (George Washington University, 1992), 91-92. Concerning Stennis’ “billions” of dollars proposal, the NASA’s space-related budget for FY59 was \$231 million and the DoD’s \$490 million. See National Aeronautics and Space Administration, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities*, (Washington, DC: USGPO, 1996), A-30.

do this or that, and then try to beat them at it, would guarantee their always being in command of the situation. We're in a race all right, but we must run it the way we want and towards goals we set for ourselves."¹¹ Privately, Eisenhower also set the tone. In a February 17, 1959 conference, his budget director informed Eisenhower that despite planned FY60 expenditures of \$830 million for NASA and ARPA, Lyndon Johnson has said "he will add substantially to the Administration's program, whatever it is. Eisenhower explained,

He could stand the pressures himself, but he was sure that the Congress would break loose under the pressure. He stated that world psychology on this matter has proven to be tremendously important - even if not too well informed. He thought it was indisputable that we must show considerable performance in this field. The pressures are great, and people are demanding miracles. . . . The President said this is a stern chase only in one field - that of propulsive capability; by concentrating on this field the Soviets are ahead of us. He said he did not minimize the importance of ourselves attaining the propulsive capabilities that we need. . . . He would like to see NASA reprogram its operations in order to put maximum effort behind the achievement of boosters of greater thrust - which is the visible element in affecting world psychology. . . . In the present circumstances, he felt we must lay more stress on not going into debt by spending beyond our receipts. At the same time, the relationship of the program to the Soviet rate of advance must be clearly recognized.¹²

All the important points are clear: a reluctance to race in general but an acceptance of its necessity in particular instances; an acceptance that a large rocket booster would be necessary for these cases in which prestige-related competition was necessary - this meant Eisenhower would support the Saturn program which in turn gave Kennedy the very beginnings of a technological foundation to approve Project Apollo to go to the moon; and a continuing concern with the Great Equation. Eisenhower's statements over the balance of 1959 and throughout 1960 support this conclusion.

For instance, Glennan recalled there was only one time in his tenure as NASA Administrator (and he was Eisenhower's only NASA Administrator) that Eisenhower ever directly told him to do anything. In the summer of 1959, "As I started to walk out the door, Ike called to me, 'Keith, there's just one thing that I'm very anxious that we get done. I want to see a booster rocket that will loft a house into orbit.'" Glennan responded this would take hundreds of millions of dollars, but Eisenhower simply re-

¹¹ T. Keith Glennan, "Our Plans for Outer Space," *Saturday Evening Post* 231 (February 28, 1959): 99.

¹² Memcon, February 17, 1959, dated February 24, 1959, folder: Staff Notes February 1959 (1), box 39, DDE Diary series, Ann Whitman file, DDEL, 1-4.

sponded, "Keith, go on back to your shop and get the figures put together. Let me see them." Glennan recalled that two months later, around September 1959, Eisenhower approved acceleration of the Saturn program and increased funding for it.¹³ Eisenhower himself explained that month, "If we must compete, we must focus the competition on some one or two key items where we have the best chance to do something that has great impact. We must also look for by-product contributions to our defense establishment."¹⁴

NASA did not take over management of the Saturn program from the DoD until October 1959 and so before then NASA's ability to influence its developmental priority and funding was extremely limited. It was only in association with this transfer of most of the ABMA to NASA that the conditions existed for NASA to develop the Saturn into a vehicle available for whatever prestige-related uses Eisenhower wished. Eisenhower explained on October 21, 1959 that this transfer of Wernher von Braun's team from DoD to NASA "... will force us to focus on the development of a super-booster, which to him is the key to a leading position in space activities. ... He thought the super-booster is the key to successful competition and we should concentrate on that. He recalled his principle of attacking one enemy or one principal objective at a time." Eisenhower recapitulated his space philosophy in three principles: "The first is that we must get what Defense really needs in space; this is mandatory. The second is that we should make a real advance in space so that the United States does not have to be ashamed no matter what other countries do; this is where the superbooster is needed. The third is that we should have an orderly, progressive scientific program. ..."¹⁵ Eisenhower's concept of a program of priority DoD needs (reconnaissance satellites¹⁶), NASA's prestige-related projects, and NASA's scientific R&D is one which

¹³ Oral history interview of T. Keith Glennan, May 29, 1987, NASM, 151.

¹⁴ Memcon, September 21, 1959, dated September 23, 1959, folder: Staff Notes September 1959 (1), box 44, DDE Diary series, Ann Whitman file, DDEL, 3.

¹⁵ Memcon, October 21, 1959, dated October 23, 1959, folder: Meetings with the President, box 12, OSAF, White House Office, DDEL, 2.

¹⁶ The space historian must never forget that terms or phrases such as 'military space' or 'defense needs in space' are essentially veiled references to reconnaissance satellites. Eisenhower's final space policy statement in January 1960 explained, "Space technology constitutes a foreseeable means of obtaining increasingly essential information regarding a potential enemy whose area and security preclude the

is key to understanding the space program during his administration. The development of the Saturn rocket, much larger than the then-current ICBM-based space boosters, was far enough into the future so that Eisenhower never had to specifically define exactly what prestige-oriented projects he would authorize, except to make clear that human spaceflight was not likely to be one of them.

By January 1960, "The President thought that the big booster is the only thing that will have major psychological effect, and if we are going to build it we should build it fast."¹⁷ Concerning its cost, "He said he was quite certain that we were going to have to spend an extra \$100 million on Saturn during the course of the spring, and he thought it ought to be settled at once."¹⁸ Eisenhower tasked Glennan to prepare an official request for the extra funds for Saturn and added, "... consistent with my decision to assign a high priority to the Saturn development, you are directed, as an immediate measure, to use such additional overtime as you may deem necessary."¹⁹ On February 1, 1960 Eisenhower approved adding \$113 million to FY61 appropriations to accelerate Saturn and other elements of the United States super-booster program such as studies for an even larger rocket, the Nova, that would be Saturn's successor. In addition, on January 18, 1960, Eisenhower placed Saturn in the "DX" category of the budget, signifying that it had the highest priority when scarce resources were allocated or when labor shortages emerged.²⁰

effective and timely acquisition of these data by foreseeable non-space techniques." This is not to say other military functions such as meteorology, communications, navigation, and geodesy could not be *supported* by military satellites, but reconnaissance had to be wholly *conducted* by space-borne platforms after the U-2 was shot down in May 1960. That final Eisenhower space policy of January 1960 defined the reconnaissance satellites as "satellite systems to provide optical, infrared and electronic intelligence and surveillance on a world-wide or preselected area basis" and emphasized it was the *only* satellite application currently assigned the highest national priority for both R&D and operational capability. See NASC, "U.S. Policy on Outer Space," January 26, 1960, SPI document 92, pp. 3, 7; not reprinted in *Exploring the Unknown, Volume I* because they were only recently declassified..

¹⁷ Memcon, January 11, 1960, dated January 14, 1960, folder: Staff Notes - January 1960 (2), box 47, DDE Diary series, Ann Whitman file, DDEL, 2.

¹⁸ T. Keith Glennan, recounting a January 12, 1960 meeting with Eisenhower, in J.D. Hunley, Editor, with an Introduction by Roger D. Launius, *The Birth of NASA: The Diary of T. Keith Glennan*, NASA SP-4105 (Washington, DC: USGPO, 1993), 44.

¹⁹ Eisenhower letter to Glennan, January 14, 1960, folder: Glennan, Dr. Keith - NASA, box 15, Administration series, Ann Whitman file, DDEL, 1.

²⁰ Roger E. Bilstein, *Stages to Saturn: A Technological History of the Apollo-Saturn Launch Vehicles*, NASA SP-4206 (Washington, DC: USGPO, 1980), 50. As explained in note 11 in chapter one, the subject of the space launchers in general, and the NASA-DoD interaction in particular, is a topic

Eisenhower therefore was willing to spend significant sums for one project, a next generation space launcher, that would give the United States the capacity at some point in the future to launch unspecified prestige-related payloads in a competitive context with the USSR.

Eisenhower repeatedly tried to assure the public that the United States space program was in fine shape. At a January 26, 1960 press conference, when asked if the United States should not move with a greater sense of urgency in competing with the USSR in space, he replied, "Not particularly, no." He explained that the United States had achieved in five years what the Soviets had been working on since 1945. Therefore, "I don't think that we should begin to bow our heads in shame. . . . I think that once in a while we ought just to remember that our country is not asleep, and it is not incapable of doing these things: indeed, we are doing them."²¹ A week later he tried to explain:

The reason for going into space, except for those activities that are carried on by the Defense Department . . . is purely scientific. Therefore, you are not talking about racing them [Soviets] You work out a proper and an appropriate plan of scientific exploration, and you follow it positively, rather than trying to follow along behind somebody else. Now, I have said time and again that because the Soviets are far ahead in this very large booster and engine . . . they are going to be ahead in that regard for some time, because it takes time to get that engine built.

Therefore, he had decided to spend the extra \$100 million on Saturn.²²

Eisenhower felt that NASA's program of scientific R&D had as much potential for winning prestige for America as did the Soviet pattern of lifting huge payloads into space. In August 1960 he commented on assorted American space accomplishments such as the Pioneer V solar satellite, the Tiros I meteorological satellite, the Transit I navigation satellite, and the Echo I passive communications satellite and emphasized, "All these are the result of a well planned and determined attack on this new field - an

meriting separate book-length treatment. This Bilstein book is the best source for detailed information on the extremely complex Saturn program and the many vehicles belonging to the Saturn family of boosters. For instance, the Saturn V that took Americans to the moon had many characteristics in common with those proposed for the Nova vehicle in the early NASA studies. Other programs sharing the top priority DX rating were the various ballistic missiles and the reconnaissance satellite program. See Marion W. Boggs, Deputy Executive Secretary, Executive Office of the President, NSC, NSC 6021, "Missiles and Military Satellite Programs," December 14, 1960, SPI document 722, p. 3.

²¹ Eisenhower Press Conference, January 26, 1960, *Public Papers of the President, 1960-1961* (Washington, DC: USGPO, 1961), 127.

²² Eisenhower Press Conference, February 3, 1960, *ibid.*, 146.

attack that promises very real and useful results for all mankind. . . . The United States leads the world in the activities that promise real benefits to mankind."²³ One tally showed that by the end of Eisenhower's term, the United States had launched 31 earth satellites and two deep space probes: the Soviets seven and one.²⁴ Glennan said by 1960 he considered the United States to be behind the Russians in total thrust available and in thrust from first stage boosters, but "In all other areas, it is my considered opinion that we are not behind the Russians, that we are equal or the better of the Russians."²⁵ Eisenhower concurred in his final State of the Union message, stating that United States scientific achievements in space ". . . unquestionably make us preeminent today in space exploration for the betterment of mankind."²⁶ Eisenhower asserted, "The significance of the space program is that it affects the morale of our people. In the field of space there are a certain number of things that affect defense directly. Basically, however, the program is scientific."²⁷

Balance

Perhaps the key word for analyzing Eisenhower and space-related prestige is "balance." He did not totally discount the concept, as evidenced by his strong backing of the Saturn program and his transfer of it from the DoD to NASA. But prestige could only be part of a balanced program in which the DoD's interests were paramount and in which NASA's scientific programs played an important role. The American space program could only achieve stability if it refused to lurch from one priority to another.

²³ Statement by the President on U.S. Achievements in Space, August 17, 1960, *ibid.*, 643-44.

²⁴ Eugene M. Emme, *A History of Space Flight* (New York: Holt, Rinehart and Winston, Inc., 1965), 161. Nevertheless, the total of Soviet payloads launched was 87,000 lbs. while the US's was only 34,240. In addition, of the 33 US launches, 24 were conducted by the Air Force, five by the Army, three by NASA and one by the Navy. Of the satellite payloads themselves, the Air Force had built 15, NASA ten, and the Army and Navy four each. See Loyd S. Swenson Jr., James M. Grimwood, Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966), 303.

²⁵ Cited in *ibid.*, 159.

²⁶ Eisenhower, State of the Union Address, January 12, 1961, reprinted in Robert L. Branyan and Lawrence H. Larsen, editors/compilers, *The Eisenhower Administration, 1953-1961: A Documentary History* (New York: Random House, Inc., 1971), volume II, 1356.

²⁷ Memcon, November 21, 1959, dated January 2, 1960, folder: Staff Notes - November 1959 (2), box 45, DDE Diary series, Ann Whitman file, DDEL, 3.

perpetually reacting to whatever spectacular feat the Soviets accomplished. PSAC's "Introduction to Outer Space" in March 1958 clearly stated the four reasons for exploring space (national defense, urge to discover, prestige, scientific knowledge) and the balanced program principle continued throughout NASA's history under Eisenhower. His commitment to balance as expressed in the Great Equation continued to the end of his administration. On March 10, 1959 he reminded Congressional Republicans, "Once you spend a single dollar beyond adequacy, you are weakening yourself. . . . Anyone who has read even a little bit on Communism . . . all the way back to Lenin, knows that the Communist objective is to make us spend ourselves into bankruptcy. This is a continuous crisis."²⁸ Eisenhower said in late 1959 that ". . . if he had to approve another unbalanced budget he would be obliged to regard his Administration as discredited."²⁹ Eisenhower's commitment, enshrined in the Space Act, was to ensure the United States was a leader in space, not the leader, in space.

Eisenhower concluded his funding of NASA was entirely adequate for a well-balanced program: "The program, of course, that is already set up is, to my mind, a rather - well, indeed it *is* quite generous. . . . Now remember, Glennan and his crowd are supposed to have the peaceful uses; this, therefore, is not involved except you might say psychologically, in our defending the United States. This seems to me to be a quite splendid program; I mean, a very well supported one."³⁰ Glennan explained that Eisenhower's request for \$230 million for Saturn in FY61 would lead to an expected first operational launch before the end of 1964: "I doubt that the Soviet Union will exceed us in thrust capability after that time."³¹

Some budget figures help illustrate the principles of balance, priority of defense needs (reconnaissance satellites) and limiting expenditures devoted solely to prestige in space. NASA's first budget

²⁸ L.A. Minnich, Notes on Legislative Leadership Meeting, March 10, 1959, folder: Staff Notes - March 1-15 (1), box 39, DDE Diary series, Ann Whitman file, DDEL, 5.

²⁹ Memcon, November 17, 1959, dated December 1, 1959, folder: Staff Notes - November 1959 (2), box 45, DDE Diary series, Ann Whitman file, DDEL, 2.

³⁰ Eisenhower Press Conference, July 29, 1959, *Public Papers of the Presidents, 1959* (Washington, DC: USGPO, 1960), 556. Emphasis in original.

³¹ Glennan, statement to the NASA Authorization Subcommittee of the Senate Committee on Aeronautical and Space Sciences, March 28, 1960, folder: Glennan Speeches and Congressional Statements, Glennan subseries, Administrators series, NHDRC, 11.

was for the period from October 1958 to the start of the next fiscal year in June 1959. NASA received \$242M (of which \$58 million was transferred from the USAF and \$59 million from ARPA); by way of comparison, the military space program (assigned to ARPA at the time) totaled \$294 million, of which the USAF's reconnaissance satellite (now called "Sentry" and later SAMOS so as to have no connotations with weapons) received \$186 million. Therefore, the entire space budget was \$536 million.³² An interesting prefatory note for the next chapter is that only \$87 million of NASA's budget and \$10 million of ARPA's was devoted to human space flight technology.³³

By the end of the Eisenhower administration, Glennan and others were fighting Congress who wanted to cut the space budget below what Eisenhower requested. For instance, Glennan pleaded with the Senate Appropriations Committee on May 19, 1960 for a restoration of the \$39 million cut by the House from the \$915 million presidential request: "This reduction will materially restrict, if not substantially jeopardize, our progress toward the national objectives of scientific and technical leadership in the aeronautical and space fields. . . . On the one hand we are repeatedly urged to 'leapfrog the Russians' with our technological efforts and on the other, we are expected, apparently, to carry out space efforts with reductions" made to a carefully crafted, conservative budget.³⁴ In FY60 the Congress appropriated \$23 million less than Eisenhower asked and in 1961 \$1 million less.³⁵ General budgetary trends for the Eisenhower administration were as follows, in millions of real-year dollars:

³² Maurice Stans, BoB Director, memorandum to Eisenhower, July 29, 1958, folder: Staff Memos - July 1958 (1), box 35, DDE Diary series. Ann Whitman file, DDEL, 1.

³³ Killian, A Brief Summary prepared for the first NASC meeting, August 5, 1958, tab 1-2, box 1, Record Group (RG) 200, National Archives and Record Administration (NARA), 14. Declassified at author's request.

³⁴ Statement by Glennan to the Subcommittee on Independent Offices of the Senate Appropriations Committee, May 19, 1960, folder: Glennan Speeches and Congressional Statements, Glennan sub-series, Administrators series, NHDRC, 1-2.

³⁵ NASA, *Preliminary History of NASA: 1963-1969*, Final Edition, Administrative Histories Project, January 15, 1969, p. II-11.

	<u>NASA</u>	<u>DoD</u>
1959	261	490
1960	462	561
1961	926	814 ³⁶

(both FY61 sums augmented by Kennedy)

Eisenhower's NASA request for 1962 was \$965 million: his hope was to level off NASA's budget at approximately the \$1 billion level. Therefore, he permitted a five-fold increase in civilian space spending in the final term.³⁷ It is true that Eisenhower did not authorize space expenditures on the scale that Kennedy and Johnson would. On the other hand, he was building from ground zero and did in fact permit a several-fold increase in space spending: in addition, Congress reduced his requests at the end of his administration.

Cooperate in Space with the Soviets?

A subsidiary factor to mention in the space for prestige and competitive race discussion for Eisenhower, Kennedy, and Johnson is the question of cooperating in space with the Soviet Union. All three presidents explored this area and all three failed to achieve major breakthroughs. The reality of the cold war competitive dynamic in space consistently overshadowed the rhetoric from both sides concerning the desirability of cooperation. Even though Eisenhower was not enthusiastic about competing in space, only reluctantly accepting the need to do so with the Saturn project, his efforts at space cooperation came to naught. Much more was this the case for Kennedy who featured prestige-based competition via human spaceflight as the centerpiece of his space policy, even while offering to make the lunar landing project a joint one.

For Eisenhower, international cooperation meshed nicely with his space for peace policy. He saw no reason why the United States and the USSR could not jointly pursue scientific projects in space, thereby emphasizing that weapons systems had no place in space while simultaneously paving the way for reconnaissance satellites because if both nations were working together on scientific satellites that overflew each other's territory and neither nation protested, the legal regime of overflight would be established

³⁶ NASA, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities*, A-30.

³⁷ Eisenhower, Annual Budget Message to the Congress, Fiscal Year 1962, January 16, 1961, *Public Papers of the President, 1960-61*, 970. By 1965, Kennedy and Johnson orchestrated another five-fold increase, to over \$5 billion.

for subsequent reconnaissance satellites. Important in this scheme is the fact that the Eisenhower administration did not see reconnaissance satellites as "weapons systems" and ensured the Air Force changed its nomenclature from WS for Weapon System 117L to the more innocuous Sentry.³⁸ Reconnaissance satellites were viewed as wholly peaceful because they conducted only the defensive operations of gathering information and did not have any capability to deliver bombs or offensive power of any kind. Endorsing and pursuing "space for peace" was wholly consistent with endorsing and pursuing reconnaissance via satellites at the earliest possible moment because the satellites were seen as an effective deterrent to war. The reconnaissance satellites would lessen the danger of surprise attack through an "... unrelenting and increasingly sophisticated effort to peel away the mask that concealed the enemy's most important military and industrial secrets."³⁹

Therefore on January 12, 1958, even before NASA was created, Eisenhower wrote Soviet Premier Nikolai Bulganin to propose, "... that we agree that outer space should be used only for peaceful purposes. We face a decisive moment in history in relation to this matter. . . The time to stop is now. Should not outer space be dedicated to peaceful uses of mankind and denied to the purposes of war?"⁴⁰ The Soviets' response set their pattern of intransigence as they accused the United States, which had yet to launch a satellite, of wanting "to prohibit that which they do not possess."⁴¹ On February 15 Eisenhower

³⁸ ARPA Director Roy Johnson on October 20, 1958 ordered the Air Force to cease using the WS designation "to minimize the aggressive international implications of overflight. . . . It is desired to emphasize the defensive, surprise-prevention aspects of the system. This change . . . should reduce the effectiveness of possible diplomatic protest against peacetime employment." Letter from Johnson to Schriever, October 20, 1958, cited by R. Cargill Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in John M. Logsdon, w/Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 229, note 72.

³⁹ William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Berkley Books, 1986), 134.

⁴⁰ Reprinted in State Department, report to McGeorge Bundy, Summary of Foreign Policy Aspects of the U.S. Outer Space Program, June 5, 1962, SPI document 1539, p. 10. Eisenhower continued to address letters to Bulganin because he was Premier and Chairman of the Council of Ministers, even though he Khrushchev as First Secretary of the Communist Party exercised the real power.

⁴¹ Soviet response reprinted in Branyan and Larsen, 650.

tried again: "If this peaceful purpose is not realized, and the worse than useless race of weapons goes on, the world will have only the Soviet Union to blame. . . . A terrible new menace can be seen to be in the making. That menace is to be found in the use of outer space for war purposes. The time to deal with that menace is now. It would be tragic if the Soviet leaders were blind or indifferent toward this menace."⁴²

This cold war confrontational tone tended to characterize the attempts at United States-USSR space cooperation until the mid-1960s.⁴³ NSC 5814/1, official United States space policy, clearly stated the United States should pursue international cooperation in space ". . . as a means of maintaining the U.S. position as the leading advocate of the use of outer space for peaceful purposes" and therefore the United States should ". . . be prepared to join with other nations, including the USSR, in cooperative efforts." Why? Because, the United States should ". . . seek to achieve common agreement to relate such negotiations to the traversing or operating of man-made objects in outer space, rather than to define regions of outer space." The legalized right of overflight would thus be facilitated.⁴⁴ Scholars of this time period extending to the mid-1960s correctly conclude, "The simple but historic fact was that it had be-

⁴² Ibid., 650-51.

⁴³ It should be noted at this point that an issue raised in chapter for the pre-Sputnik era still held true after Sputnik. Eisenhower's attitude toward the Soviet Union and the overall cold war had Janus-like, looking-in-both-directions quality. So would Kennedy's approach. Hope for arms control, conciliatory gestures, and a spirit of bipartisanship alternated with confrontational rhetoric and brinkmanship. For instance, NSC 5810/1, Basic National Security Policy, May 5, 1958 stated, "The United States should continue its readiness to negotiate with the USSR whenever it appears that U.S. interests will be served thereby. . . . Agreements with the USSR should be dependent upon a balance of advantages" and not implied good will or trust; "Safeguarded arms control should be sought with particular urgency, in an effort to reduce the risk of war." See NSA PD 556, p. 19. Conversely, after the failure of disarmament and test ban talks, Eisenhower wrote, "The Soviet Union, far from following a comparable [to the US's] policy of restraint appears to have undertaken with deliberate intent a policy of increasing tension throughout the world and in particular of damaging relations with the US." The USSR "has threatened rocket retaliation against . . . the United States on the pretext of contrived and imaginary intentions. . . . The Soviets have unilaterally disrupted the ten-nation disarmament talks in Geneva" and therefore bears full responsibility "for the increased tension and the failure to make any progress in the solution of outstanding problems." Eisenhower, letter to Khrushchev, October 2, 1960, *Public Papers of the President, 1960-61*, 743. As Eisenhower summarized in his memoirs, "Of the various presidential tasks to which I early determined to devote my energies, none transcended in importance that of trying to devise practical and acceptable means to lighten the burdens of armaments and to lessen the likelihood of war. . . . In the end our accomplishments were meager, almost negligible. . . . That failure can be explained in one sentence: It was the adamant insistence of the Communists on maintaining a closed society." Eisenhower, *Waging Peace* (New York: Doubleday & Company, Inc., 1965), 467-68.

⁴⁴ NSC 5814/1, *supra*, 20.

come fully evident that there was no prospect of the United States and the USSR getting together in a way that would have forestalled the extension of their existing differences and rivalries into the new domain of space. . . . The frame of reference would henceforth be one of an ongoing competitive race for national advantage in space."⁴⁵ The ambassador to the Soviet Union during the Kennedy administration, Foy

D. Kohler, explained:

There stood for more than a decade a single compelling fact: it proved impossible in practice to effect anything more than token cooperation between the two great space powers of the world. . . . after some ten years at effort at direct cooperation between the two countries, nothing to speak of had actually happened. How could this be? The answer is simple and straightforward: despite our hopes and expectations, the Soviet leadership has repeatedly and consistently refused to approach any relationship in the space area outside the context of the overall relationship between the two countries.⁴⁶

Arnold Frutkin, NASA's long-time Director of International Programs, provided another primary source attestation to this assessment when he said shortly after the end of the Eisenhower administration that the USSR ". . . has, so far at least, rejected or failed to follow through on every proposal for substantive cooperation in space science made by the United States or the scientists of other nations. . . . The fact is that the Soviet Union neither leads nor follows in international efforts in space research."⁴⁷ Their space program provided them a valuable worldwide image of a progressive, technologically advanced nation. The Soviets saw no reason to cooperate in any substantive manner when they could continue to enjoy the geopolitical benefits of this perception.

The remainder of the history of international cooperation and bilateral United States-USSR cooperation in space during the Eisenhower administration consists of the December 1958 passage of a United Nations resolution establishing a Committee on the Peaceful Uses of Outer Space (COPUOS), the USSR's and its allies' boycotting it for two and a half years, and the United States diplomatic attempts to jump start COPUOS. Eisenhower would plead to the United Nations and, indirectly, the USSR shortly before he left office, "Will outer space be preserved for peaceful use and developed for the benefit of mankind?

⁴⁵ Dodd L. Harvey and Linda C. Ciccoritti, *U.S.-Soviet Cooperation in Space* (Miami, FL: Monographs in International Affairs, Center for Advanced International Studies, 1974), 22.

⁴⁶ Foy D. Kohler, "Forward: An Overview of US-Soviet Space Relations," in *ibid.*, xxi.

⁴⁷ Cited by Harvey and Ciccoritti, 47.

Or will it become another focus for the arms race - and thus an area of dangerous and sterile competition? The choice is urgent. And it is ours to make."⁴⁸ Nevertheless, the dreary story of UN diplomatic wrangling continued into the Kennedy administration with little movement.⁴⁹ The salient point is that United States-USSR cooperation, or lack thereof, is another illustration of the cold war dynamic permeating space policy during this era. It also illustrates how the Eisenhower administration tended to filter many space-related possibilities through the lens of how they would effect the space for peace policy and the concern for reconnaissance satellites underlying it.

Space For Peace?

The interrelated complex of reconnaissance satellites, freedom of space, and space for peace set the tenor not only for international cooperation in space as well as the overall Eisenhower space policy but also set the stage for the NASA-DoD institutional relationship. Historians must be clear as to the central importance of reconnaissance satellites and the associated idea of freedom of space which, when combined with space for scientific research, formed the space for peace policy outlined in previous chapters. The space for peace policy was as important after NASA's creation as it was before because the policy, first, provided the environment within which NASA-DoD relations would develop and, second, limited the degree to which presidents and civilian OSD leaders would permit independent USAF projects and action in space because they feared the USAF might endanger the delicate principle of freedom of space by somehow "militarizing" space through either words or deeds.

NSC 5814/1 was the space policy document approved in August 1958 as NASA was being created. It declared that the United States had not and would not recognize "any upper limit to sovereignty" nor would the United States take any "public position on the definition" in order to maintain both "flexibility in international negotiations with respect to all uses of 'space'" and "freedom of action with

⁴⁸ Eisenhower, Address Before the 15th General Assembly of the United Nations, September 22, 1960, *Public Papers of the President, 1960-61*, 714.

⁴⁹ The minutiae are not relevant to this dissertation. For the complete story see Harvey and Ciccoritti, *supra*; Arnold Frutkin, *International Cooperation in Space* (Englewood Cliffs, NJ: Prentice-Hall, 1965); and Don E. Kash, *The Politics of Space Cooperation* (West Lafayette, IN: Purdue University Studies, 1967).

respect to the military uses of 'space.'" The basic United States position would continue to be that "the right of passage through outer space of any orbiting object that is so designed that it cannot physically interfere with the legitimate activities of other nations" is completely acceptable."⁵⁰ Therefore, administration officials did not appreciate General James Gavin writing, "It is inconceivable to me that we would indefinitely tolerate Soviet reconnaissance of the United States without protest. . . . It is necessary, therefore, and I believe urgently necessary, that we acquire at least a capability of denying Soviet overflight - that we develop a satellite interceptor."⁵¹ Clearly administration officials had a legitimate concern about the space for peace principle being endangered by certain military pronouncements. Eisenhower's final science adviser George Kistiakowsky recalled how he had made it clear to officials still active within the administration that Eisenhower discouraged such "dangerous statement[s] about destruction of enemy satellites if they overfly the United States. My point was that later this would prejudice the use of our own reconnaissance satellites."⁵² Eisenhower permitted only low-level studies of offensive space weapons systems such as antiballistic missile systems, satellite interceptors, and manned orbital bombers because they could threaten the free overflight precedent.⁵³

Quarles continued to emphasize shortly before he died the original point he made immediately after Sputnik's launch: "The USSR has already established an international practice with respect to orbital space vehicles and objects by orbiting Sputniks over the U.S. and other territories and sending out other space objects without seeking prior permission to do so." Therefore, the United States should avoid making any policy statements defining exactly where space began or ended because this ". . . might conceivably limit or hamper its own freedom of action. Thus, it is to the advantage of the U.S. that no legal restrictions on the use of outer space be established" because the freedom of the United States and the free world ". . . may depend upon our freedom to make use of outer space. Thus, it would be dangerous to

⁵⁰ NSC 5814/1, *supra*, 4, 21.

⁵¹ James M. Gavin, Lieutenant General, US Army, Retired, *War and Peace in the Space Age* (New York: Harper and Brothers, 1958), 224.

⁵² Kistiakowsky, 245.

⁵³ *Ibid.*, 229-30, 239-40, 245-46.

impose limitations upon the types of activity we may find necessary to conduct there."⁵⁴ Therefore, United States space policy officials decided that international organizations such as the UN's COPUOS should be regarded "... as bearing essentially on gaining acceptance for use of reconnaissance satellites as a legitimate outer space activity. It was suggested that discussion in the UN forum be oriented toward establishing a 'freedom of outer space' concept."⁵⁵

Eisenhower's final space policy document was issued under the auspices of the NASC in January 1960 and similarly declared, "... it should be noted that definitions of 'peaceful' or 'non-interfering' uses of outer space have not been advanced by the United States. . . ." because the United States considered as already established "... the right of transit through outer space for orbital space vehicles or objects not equipped to inflict injury or damage."⁵⁶ The extremely delicate international sensibilities surrounding the issue of aircraft and satellite overflight were apparent at the brief Paris summit meeting of the United States and the USSR in May 1960. It was quickly aborted due to lingering hostility generated by the Soviet downing of a supersecret U-2 reconnaissance aircraft in May 1960 and Soviet resentment at having been overflown since 1956. As Khrushchev "read a long diatribe denouncing the U-2 flights" he screamed, "I have been overflown." To this President Charles De Gaulle of France countered that France too had been overflown, but by Soviet satellites. Khrushchev appeared "startled" and replied the USSR was innocent. De Gaulle then asked how the Soviets got photographs of the far side of the moon from its Lunik satellites. Khrushchev replied, "In that satellite we had cameras." DeGaulle sarcastically countered, "Ah, in *that* one you had cameras! Pray continue." Khrushchev demanded Eisenhower apologize; Eisenhower refused; the summit ended.⁵⁷

⁵⁴ Deputy Secretary of Defense Quarles, memorandum to the Acting Secretary of the NASC, April 15, 1959, folder: NASC 1958-1959, box: White House, National Aeronautics and Space Council, NHDRC, 1.

⁵⁵ NASC, Minutes of Meeting, April 27, 1959, folder: Summary of National Aeronautics and Space Council Meetings, 1958-1960," box: White House, National Aeronautics and Space Council, NHDRC, 6.

⁵⁶ NASC, "U.S. Policy on Outer Space," January 26, 1960, *supra*, 8, 12.

⁵⁷ Recounted by John Prados, *The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength* (New York: The Dial Press, 1982), 101. Emphasis in original.

Apparently, the assumption by some officials within the administration that the Soviet Sputniks had *de facto* established the right of satellite overflight was in reality not a *de jure* reality in the international diplomatic arena. Khrushchev declared on May 16, 1960, "... as long as arms exist our skies will remain closed and we will shoot down everything that is there without consent."⁵⁸ The United States therefore had to proceed with extreme caution in the reconnaissance satellite overflight area. It would not define exactly where space began or ended. It would support the concept of peaceful uses of space and the prohibition of the deployment of weapons of mass destruction in space as part of this peaceful uses doctrine, while considering reconnaissance satellites to not be such weapons. Finally, the executive branch would ensure the military services did not exacerbate the delicate international environment regarding overflight by discussing anything that could be construed as the militarization of space or the consideration of placing offensive weapons there. As the State Department lamented near the end of Eisenhower's term, "A Soviet political and propaganda attack on our launching a spy satellite at this time seems inevitable."⁵⁹ Unfortunately, as one noted space historian concludes, "Despite these and subsequent messages that canceled offensive space-based, weapon-research programs, Air Force military leaders at that time seemed unable to grasp - or unwilling to accept - the meaning of President Eisenhower's 'peaceful uses of outer space,' or the rationale behind it."⁶⁰

The USAF and Space for Peace

The Air Force perspective was slightly different. It believed national security demanded an investigation of the defensive and offensive potential of space. The USAF considered its presence in space to be no different than the Navy's on the high seas: ensuring the medium's peaceful use and availability for transit to all parties.⁶¹ One space historian explains the USAF viewpoint was that "... restrictions on

⁵⁸ State Department paper on SAMOS satellite, July 18, 1960, folder: 12 Satellite and Missile Programs, box 6, RG 59, General Records of the Department of State, Bureau of European Affairs, Office of Soviet Union Affairs, Subject Files 1957-1963, NARA, 1.

⁵⁹ State Department internal Memorandum, Subject: Reconnaissance Satellite Program, September 14, 1960, *ibid.*, 3.

⁶⁰ Hall, "Origins of U.S. Space Policy," 229, note 72.

⁶¹ Schriever oral history interview, by the author, July 2, 1996.

the military did not match the obligations of the military to ensure the security of the nation.” Until all nations subscribed to the space for peace ideal, “they believed the United States needed the capability to control space to ensure the liberty of free people everywhere.”⁶² For instance, when Chairman of the JCS and Air Force General Nathan Twining provided his input to 5814/1, he said the United States should “. . . place primary emphasis on activities related to outer space necessary to maintain the overall deterrent capability of the United States and the Free World.”⁶³ A fundamental premise of Air Force doctrine was then, still is, and almost certainly will be “. . . that a decisive margin of advantage goes to the nation whose delivery vehicles can attain the greatest speed, the greatest range, and the greatest altitude.”⁶⁴ The operative mantra was and is “Faster, farther, higher.”

Strategic Air Command commander General Thomas Power’s input to 5814/1 included the kind of statements that Eisenhower administration top officials felt might endanger the space for peace policy’s goals. Power said prestige comes through leadership in the clash with communism and while admitting reconnaissance was probably the most important immediate military space possibility, he maintained, “. . . close behind lies a true potential for unique and effective weapons system development. . . . We must not, in the fashion of decadent nations, permit our gross potential to be bled off into purely defensive weapons. As we enter the space era the primary of the offensive has never been more clearly defined. . . . Because space offers the ultimate in mobility and dispersal for weapons which can be addressed at the enemy heartland, the ultimate in deterrence may well be in this direction.” He believed the Air Force must “emphasize constantly the positive contribution of offensive weapons systems. The logic of this fact must

⁶² Roy F. Houchin II, Major, USAF, *The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1945-1963*, Ph.D. dissertation (Auburn University, 1994), 105. Page numbers supplied by author on sheets printed by author from computer disc copy provided by Major Houchin to author.

⁶³ Nathan Twining, Memorandum for the Secretary of Defense, August 11, 1958, *Exploring the Unknown, Volume I*, 360.

⁶⁴ USAF Director of Advanced Technology Homer Boushey, cited by Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, volume II* (Maxwell AFB, AL: Air University Press, 1989), 212.

be identified for scientific and national leaders with.”⁶⁵ In January 1959, the Air Force concluded: “We must investigate the possibility of military utilization of the moon. If we do not develop the capability to more than match each Soviet space move, we may find ourselves outflanked in the new dimension of space.” To the USAF, weapons in space were peaceful, just like “a watchman is peaceful but he must be armed. It is the intent, rather than the weapons, which determines what is and what isn’t peaceful. Likewise, our weapons of space would be peaceful - since we would never use them for aggressive purposes.”⁶⁶

Often, however, these explanation were overshadowed by declarations such as, “In twenty years, I believe both the moon and Mars will have permanent, manned outposts. . . . Another use [of satellites] will be purely military - bombardment - and accomplished by space vehicles. I use the term vehicles rather than satellites because I believe these systems will be manned. . . . It appears logical to assume we will have antisatellite weapons and space fighters.” This general opined that the only thing that would cost more than such systems “. . . would be the failure to be first on the moon. We cannot afford to come out second in a territorial race of this magnitude. . . . This outpost, under our control, would be the best possible guarantee that all of space will indeed be preserved for the peaceful purposes of man.”⁶⁷

In addition to pointing out the point of the USAF’s space philosophy that desired to explore the possible offensive potential of space for national security purposes, Power and Boushey also displayed another important component of the Air Force’s space thinking: the central role that humans would play in the space systems. Power declared, “For the long term, the critical requirement is to establish man in the space environment. In the early unmanned exploratory stages of the conquest of space, unmanned vehicles can be used for many scientific purposes, and certain specific military applications. However, to

⁶⁵ Thomas Power letter to Chief of Staff Thomas D. White, August 18, 1958, folder: Command - SAC, box 16, Thomas D. White papers, Library of Congress, 1-3.

⁶⁶ Air Force Policy on Space, briefings for the Secretary of the Air Force, January 28-29, 1959, K140.11-13, AFHSO, 7, 19. Emphasis in original.

⁶⁷ Brigadier General Homer Boushey, Director of Advanced Technology in the Office of the Deputy Chief of Staff for Development, “Blueprints for Space,” cited in LtCol Kenneth F. Gantz, editor, *Man in Space: The United States Air Force Program for Developing the Spacecraft Crew* (New York: Duell, Sloan and Pearce, 1959), 239, 241, 252-53.

fully exploit the space medium, man is the essential ingredient." The Air Force must, therefore, "Identify the mandatory presence of man in the space environment before significant fulfillment of either military or economic potentials can be enjoyed."⁶⁸ The Air Force simply assumed, "It is inconceivable that the ability of man to deal with new situations, his judgment or ability to take many unrelated facts and decide upon a course of action to accomplish his assigned mission" would not prove invaluable in space."⁶⁹ Therefore, "In reaching the objective of extraterrestrial 'high ground,' there must be a progressive development and employment of Air Force experience in manned flight."⁷⁰

The third part of the Air Force's space philosophy was introduced last chapter: the belief that it, the USAF, was the proper organization to conduct the nation's military operations in space. This illustrates that continuing interservice rivalry even after NASA's creation was one reason Eisenhower administration officials concluded they had made the correct choice then and that NASA must become a strong and independent organization. An important USAF meeting took place in late January 1959 as it tried to determine exactly what its position was in the post-NASA space structure. At this meeting the service's top generals briefed the service's top civilian officials such as the Secretary of the Air Force and its Chief Scientist. The officers emphasized, "Air Force- responsibility extends outward into space, and that there can be no line of distinction between air and space as far as operational responsibilities of the Air Force are concerned." Further, "The operational means for the overall control and direction of space activities does not and cannot exist outside a military service." Which is to say, not in NASA. In addition, "The control of space activities and operations for military purposes is but a normal extension of the control of air activities by the Air Force." Which is to say, not part of the Army, Navy, or ARPA. Therefore, "The Air Force has no quarrel with NASA and ARPA but the basic responsibility for the overall space defense of the United States, and the military position of the United States in space, cannot

⁶⁸ Power to White letter, August 18, 1958, 2-3.

⁶⁹ Air Force Policy on Space, briefings for the Secretary of the Air Force, January 28-29, 1959, 14.

⁷⁰ Major General Dan C. Ogle, Surgeon General of the USAF, cited in Gantz, 3.

be abandoned. No organization other than the Air Force exists or is contemplated which would carry out such a mission.”⁷¹

Part of the USAF's concern for securing the space mission was the belief that its future may very well have depended on it. In the late 1950s the Air Force was operationally deploying its ICBMs and there was some institutional concern that the Air Force officer corps would be transformed from dashing and courageous pilots into the “silent silo sitters of the seventies.”⁷² Eisenhower told Chief of Staff of the Air Force (CSAF) Thomas White, its top-ranking officer, that the USAF's success in rocketry “has made possible and necessary reductions in aircraft programs. It is a change in our thinking.” White replied this raised “. . . the question of what is the future of the Air Force and of flying. This shift has a great impingement on morale. There is no follow on to the fighter, and no new opportunity for Air Force personnel. A natural extension of Air Force activity would be into space as flying drops off. He wanted the predominant role in space for the Air Force.”⁷³ In public forums, this institutional concern often took the form of the Air Force emphasizing the defense aspects of space. As White wrote in a 1959 book, “The United States must win and maintain the capability to control space in order to assure the progress and preeminence of the free nations. If liberty and freedom are to remain in the world, the United States and its allies must be in a position to control space. We cannot permit the dominance of space by those who have repeatedly stated they intend to crush the free world. . . . only through our military capability to control space will we be able to use space for peaceful purposes.”⁷⁴

⁷¹ Ibid., 1.

⁷² “Silent silo sitters” phrase from Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana, IL: University of Illinois Press, 1964), 171. It should be noted that while the author has attempted to maintain an objective approach toward all research questions and conclusions throughout this dissertation, I have been and am an active duty officer in the Air Force. In addition, my career classification is “Space and Missile Operations” and as a Missile Combat Crew Commander in the late-1980s and early-1990s I was, in fact, a “silent silo sitter” for several years.

⁷³ Memcon, November 18, 1959, but dated January 20, 1960, folder: Department of Defense, Volume III (8), box 2, Department of Defense subseries, Subject series, Office of the Staff Secretary: Records, White House Office, DDEL, 8.

⁷⁴ Thomas White, “Space Control and National Security,” in the editors of *Air Force Magazine, Space Weapons: A Handbook of Military Astronautics* (New York: Frederick A. Praeger, 1959), 11, 13.

This three-fold Air Force space philosophy (guarantee American security using space if necessary, the USAF should be the institution to do so, humans will play a central role in space systems) made little headway with the civilian policy makers of the Eisenhower administration. The fundamental problem is pointed out by a historian who explains that the tendency over history has been for air power theorists to promise more than their chosen technological instrument could deliver. However, concerning space, exactly the opposite has been true: "... the technology has far outpaced any coherent doctrine on how to employ space systems effectively."⁷⁵ The Air Force's inability to articulate convincingly and precisely what humans would do in space, to the satisfaction of its civilian overseers in the OSD and higher in the executive branch, meant it could not establish an independent, long-term, human presence in space.

Air Force Philosophy Made Little Headway

The primary reason for the administration's reluctance to endorse this Air Force space philosophy was the simple fact that it directly contravened the intent of Eisenhower's space for peace policy and risked casting a military aura onto the American space program, exactly what Eisenhower wanted to avoid. Several secondary reasons also contributed to the policymakers' aversion toward the Air Force's space philosophy, of which the financial and the interservice rivalry factors are paramount. When the Air Force discussed its "aerospace" with the inherent idea that only the Air Force had a legitimate military mission in space, Representative Daniel J. Flood sarcastically responded, "This is a beauty. . . . That means everybody is out of space and the air except the Air Force, in case you didn't know it. Has the Air Force, without consulting anybody taken the Navy out of air and space? . . . They have to have something to stay in business. You had better get there, or you won't be around."⁷⁶ Meanwhile, the Army continued to strive for an active role in space and would continue to do so until its Eisenhower authorized transfer of the ABMA to NASA in the fall of 1960. The culmination of the Army's effort was "Project Horizon" of June 1959.

⁷⁵ Phillip S. Meilinger, Colonel, USAF, *10 Propositions Regarding Air Power* (Washington, DC: USGPO, 1995), 84.

⁷⁶ Cited in Lee Bowen, *An Air Force History of Space Activities, 1945-1959*, (Washington, DC: USAF HDLO, 1964), SHO-C-64/50, 189. Flood was an ardent congressional supporter of the US Navy.

Project Horizon was a four-volume Army study for a lunar base and all the associated supporting systems (launch vehicles, space capsules, etc.) It concluded, "Military, political and scientific considerations indicated that it is imperative for the United States to establish a lunar outpost at the earliest practicable date." It would facilitate communications and surveillance but also "establish and protect U.S. interests on the moon." If the United States did not start a lunar outpost program quickly, it would forfeit "... the chance of defeating the USSR in a military-technological race which is already recognized as such throughout the world." The Army anticipated 149 Saturn 1B launches to build and equip the base with the first manned landing in April 1965 and a total cost of \$6.01 billion.⁷⁷ The Army played the prestige card: "The primary implication of the feasibility of establishing a lunar outpost is the importance of being first." Failure to be first in space produces implications which the Army considered a matter of "public record."⁷⁸ ABMA commander Major General John Medaris later commented that Horizon was "... shot down in flames by the assignment of all space vehicles to the Air Force."⁷⁹

In April 1960, the Air Force released its own lunar base study. It claimed the USAF could send a man to the moon and return him in 1967 and have a fully operational lunar base by June 1969, performing earth surveillance, at a total cost of \$7.7 billion. The Air Force posited a lunar base was necessary because provided "a site where future military deterrent forces could be located. . . . A military lunar system has the potential to increase our deterrent capability by insuring positive retaliation."⁸⁰ As R. Cargill Hall summarizes, "Besides flying in the face of stated administration commitments to explore and use

⁷⁷ US Army, Redstone Arsenal, Scientific Information Center, *Project Horizon, Volume 1, Summary, A U.S. Army Study for the Establishment of a Lunar Military Outpost*, June 8, 1959, folder: Project Horizon, DoD subseries, Federal Agencies series, NHDRC, 1, 5, 56.

⁷⁸ *Ibid.*, 46-47.

⁷⁹ John B. Medaris, Major General, Retired, with Arthur Gordon, *Countdown for Decision* (New York: G.P. Putnam's Sons, 1960), 298.

⁸⁰ Air Force, Research and Development Command, Ballistic Missiles Division, Military Lunar Base Program or S.R. 183 Lunar Observatory Study, April 1960, SPI document 1212, p. 1, 4-7. Portions of this study are reprinted in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 304-11.

outer space for peaceful and defensive purposes only, these proposals gained few adherents other than those who already viewed the Soviet sputniks with unalloyed hysteria."⁸¹

As Kistiakowsky recalled, this and many other self-aggrandizing service proposals for grandiose military space projects "... were quite partisan, to put it mildly. . . . Rather awful. . . I still recall becoming indignant on discovering that the cost of exclusively paper studies in industrial establishments on 'Strategic Defense of Cis-Lunar Space' and similar topics amounted to more dollars than all the funds available to the NSF for the support of research in chemistry. I tried to raise hell about this with [DDR&E] York. . . ."⁸² NASA Administrator Glennan watched the interservice maneuverings with some bemusement. He called one USAF-Navy dispute concerning space responsibilities on the west coast, "... an argument that has bordered on the ridiculous. . . . The situation reminded me of two little boys arguing over which of their fathers could lick the other."⁸³

The other secondary reason the USAF space philosophy made little headway during the Eisenhower, or subsequent, administrations was the financial issue - duplication, wasteful expenditures, duplication, etc. This meant that unless performing a particular task in space offered identifiable functional efficiencies (like reconnaissance, meteorology, communications, or navigation) or financial savings (this, arguably, never materialized in the military arena because of the continuing high cost of launching payloads to orbit), then that task would not be performed in space and little exploratory R&D for it would be authorized. As early as April 1959 the civilian Undersecretary of the Air Force said, "Future military needs will be satisfied by the use of whatever future weapons and techniques will provide improved capabilities or effectiveness. If so-called 'space systems or techniques' can improve the military potential,

⁸¹ Hall, "Origins of U.S. Space Policy," 226, note 63.

⁸² Kistiakowsky, *Scientist at the White House*, 120, 141. Kistiakowsky refers to seven Air Force study programs active during the final years of the Eisenhower administration: SR 178, Global Surveillance System; SR 181, Strategic Orbital System; SR 182, Strategic Interplanetary System; SR 183, Lunar Observatory (the program discussed in the preceding paragraph); SR 184, 24 Hour Reconnaissance Satellite; SR 187 Satellite Interceptor System; SR 192, Strategic Lunar System. See "The Air Force Space Study Program," no date, though probably late 1958, K140.11-13, p.1. The total budget for the studies as described in this document, probably for 1958, was \$2.7 million.

⁸³ Glennan, *The Birth of NASA*, 85.

they undoubtedly will be used. However, space is not a function, it is a location, and as such it may or may not permit the traditional military missions to be performed more effectively."⁸⁴

This sentiment echoed strongly throughout the remainder of the Eisenhower administration and into the McNamara era at DoD following. Secretary of Defense Thomas Gates stated early in 1960 that the DoD was "not interested in space flight and exploration as ends in themselves. Our space efforts are an integral part of our over-all military program and will complement our other military capabilities."⁸⁵ The President borrowed this language in his annual space report to Congress, declaring that the DoD's space programs "... are a means toward achieving a more effective military posture for the United States and its allies, rather than space flight and exploration as ends in themselves. Therefore, the space efforts of the Department of Defense are an integral part of our overall military program and will complement or supplement other military capabilities."⁸⁶

Try as they might, however, to limit military space spending to only those subjects likely to enhance current capabilities, administration officials such as Kistiakowsky could still listen to Air Force briefings on the proposed USAF space program and be "... shocked by the incredible wastage of taxpayers' money. For instance, \$8 million spent in paper studies such as lunar defense systems."⁸⁷ Two months before the end of his administration, Eisenhower reacted to a briefing on the proposed military space program: "... the President said that he did not know where the money for such programs was going to come from. It seemed to him that we should finally reach the point where these programs were not constantly going up until they absorbed nine-tenths of our research money. We should determine

⁸⁴ Undersecretary of the Air Force Malcolm MacIntyre, Memorandum to ARPA Director Roy Johnson, Advanced Program Areas for Military Space Systems, April 14, 1959, SPI document 274, p. 1.

⁸⁵ Address by Secretary of Defense Thomas Gates, January 27, 1960, reprinted in Director of Information, Office of the Secretary of the Air Force, *Air Force Information Policy Letter, Supplement for Commanders, Special Issue: Military Mission in Space, 1957-1962*, p. 4.

⁸⁶ Congress, House, *U.S. Aeronautics and Space Activities, January 1 to December 31, 1959*, Message from the President of the United States Transmitting the Second Annual Report of the Nation's Activities in the Fields of Aeronautics and Space, House Document No. 349, 86th Congress, 2nd Session, February 25, 1960, p. 22.

⁸⁷ Kistiakowsky reflecting on an August 5, 1960 briefing in *Scientist at the White House*, 383.

some sort of level of effort and set a dollar ceiling which would be changed only if there were some sort of startling development.”⁸⁸ An important point to highlight in the overall NASA-DoD framework is that “. . . much of the struggle over the military uses of space was as much between elements within DOD as between DOD and NASA.”⁸⁹

The NASA-DoD Relationship I

The foregoing discussion sets the stage for the specific NASA-DoD relationship that emerged. The President wanted to protect his space for peace initiatives and so Air Force space proposals had to be kept under control and NASA nurtured. The first task relevant to the NASA-DoD relationship was the division of projects and facilities when NASA began operations in October 1958. The most important decision, the assignment of the human spaceflight mission to NASA and the program’s subsequent development, is covered in the next chapter. Other project and facility assignments occupy an important supporting role in the human spaceflight story.

Division of Labor

The division of labor process started on April 2, 1958, the same day Eisenhower submitted his version of the Space Act to Congress. He wrote the Secretary of Defense and the NACA Chairman to explain his philosophy concerning which organization would do what under the new legislation: “. . . it is appropriate that a civilian agency of the Government take the lead in those activities related to space which extend beyond the responsibilities customarily considered to be those of a military organization.” Eisenhower said it was “especially felicitous” that the NACA and the DoD had such a close and harmonious relationship because, “This relationship will ease the period of transition that lies ahead and will provide a basis for the close cooperation that will be needed to solve the difficult problems that will be encountered.” NACA and the DoD should therefore “. . . formulate such detailed plans as may be required to reorient present programs, internal organization, and management structures” in accordance with the

⁸⁸ NSC, Memorandum of Discussion at the 466th Meeting of the NSC, November 7, 1960, dated November 8, 1960, folder: 466th Meeting of the NSC, box 13, NSC series, Ann Whitman file, DDEL, 2.

⁸⁹ Arnold S. Levine, *Managing NASA in the Apollo Era* (Washington, DC: USGPO, 1982), 211.

pending Space Act and form recommendations concerning which programs would be transferred to NASA.⁹⁰

Later that month NACA and the DoD responded with a general guide as to the appropriate division of labor. They had decided that the military unquestionably should be responsible for these missions: reconnaissance and surveillance,⁹¹ countermeasures against space vehicles, weapons in space, and navigational aids. Missions going to NASA without dispute would be unmanned space flights for scientific data such as vertical probes, lunar and interplanetary probes, and scientific satellites. However a gray area termed "common interest programs" included: human space flight; large rocket engines; communications satellites and meteorological satellites.⁹² A neat and orderly division of effort to include projects and facilities was clearly not going to be an easy task. The BoB stated its opinion: "From our review, it appears to us that the only major project proposed for FY 1959 that is 'peculiar to or primarily associated with weapons systems or military operations' is the so-called 'Advanced Reconnaissance Satellite' project."⁹³ This was the technical name for Sentry, the renamed WS-117L.⁹⁴ At a minimum, an ambitious military space program was going to be a difficult row for the Air Force to hoe.

⁹⁰ Eisenhower, Memorandum for the Secretary of Defense and the NACA Chairman, April 2, 1958, folder: National Aeronautics and Space Administration (1), box 44, Confidential File, White House Central Files, DDEL, 1-2.

⁹¹ Burrows differentiates between the two as follows: reconnaissance "has to do with the active pursuit of specific information, such as the performance characteristics of a ballistic missile. Surveillance entails the passive, systematic watching or listening for something to happen, such as a ballistic missile being fired." *Deep Black*, xxv.

⁹² NACA Chairman and Secretary of Defense joint memorandum to the President, dated only April 1958, folder: Department of Defense Liaison, box: White House, Presidents, Eisenhower, DOD/CIA Information, NHDRC, 1-2.

⁹³ Memo from the Military Division of the BoB to the BoB Director, Status report on the space program, June 10, 1958, folder: Pre-NASA Documents, NACA-DOD Talks, box: Administrative History, Pre-NASA Documents, NASA/DoD, NHDRC, 2.

⁹⁴ The final name for WS-117L, after being referred to as Sentry for a period of time, would be Samos (some said this referred to Satellite and Missile Observation System, some said it simply was the name of an island in the Aegean Sea, picked at random.) America's first operational reconnaissance satellite, the Corona project, was outside of this strictly Air Force framework, as will be seen at the end of chapter 5.

Eisenhower's assessment was that anything "not yet proved as to technical feasibility should be the concern of this agency [NASA], and that non-military applications should also be the concern of this agency."⁹⁵ He told the NSC on August 14, 1958, "We should put, as far as possible, all space projects under the space agency [NASA, which] must prove the military practicability or feasibility of a given space project or activity before the Defense Department takes over such a project or activity. . . . Not every activity in outer space is going to turn out to have military use."⁹⁶ August 1958 was the same month Eisenhower awarded NASA the human spaceflight mission, not the DoD. One week before NASA began operations, "The President reaffirmed that NASA should be the heart of the whole activity: unless a project is a very definite application to a specific military purpose, it should be in NASA. . . . The President said that, unless definite military purpose can be shown, the responsibility and the funds should be in NASA."⁹⁷ Again, the general situation was not a fertile one for the development of a robust and diverse military space program.

Accordingly, Eisenhower's Executive Order 10783 on October 1, 1958 transferred from DoD to NASA: Project Vanguard; lunar probes; scientific satellites; passive communication satellites; and most rocket engine research (but not Saturn or its management agency the ABMA).⁹⁸ One primary source recounts these transfers ". . . had left some feeling in DOD that the Services had been deprived of something which was theirs by right of initiation and, in some cases, ultimate user status. This, in turn, had caused some reluctance to enter into a fully cooperative partnership of mutual support in aerospace activi-

⁹⁵ Memcon, July 17, 1958, dated July 18, 1958. Folder: Staff Memos - July 1958 (1), box 35, DDE Diary series, Ann Whitman files, DDEL, 2.

⁹⁶ NSC, Memorandum of Discussion at the 376th Meeting of the NSC, August 14, 1958, dated August 15, 1958, folder: 376th Meeting of NSC, box 10, NSC series, Ann Whitman file, DDEL, 6.

⁹⁷ Memcon, September 23, 1958, from *The Diaries of Dwight D. Eisenhower, 1953-1961*, Microfilmed from the Holdings of the Dwight D. Eisenhower Library, Robert Lester, Editor, part of the *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenburg, General Editor (Bethesda, MD: University Publications of America, 1986), as deposited in the LoC, reel 18, p. 2.

⁹⁸ Eisenhower, Executive Order 10783, "Transferring Certain Functions from the Department of Defense to the National Aeronautics and Space Administration," October 1, 1958, SPI document 1124, pp. 1-2.

ties.”⁹⁹ A secondary source calculates, “No other agency of the Executive Branch of the Federal Government has been created by the transfer of so many units and programs from other departments.”¹⁰⁰ There was enough grumbling within the military space agency over the scope of the transfers that ARPA Director Roy Johnson informed his staff it was “ARPA’s policy to provide the fullest kind of support and assistance to the National Aeronautics and Space Agency [sic] in all areas. . . . It is, moreover, ARPA policy to support fully the transfer of functions prescribed by the statutes establishing NASA.” He admitted that some of these transfers “. . . will initially appear to be contrary to the apparent requirements of the Department of Defense. I am satisfied that with good will and cooperation among all parties, a middle course will be developed. . . . I desire that all ARPA personnel adhere strictly to the policy of supporting the programs of the National Aeronautics and Space Agency [sic] and the letter and the spirit of the statute under which the relationships of the Department of Defense and that Agency are prescribed.”¹⁰¹

One analyst explains this “major change” in the old NACA-DoD relationship: “Whereas in prior years NACA had been a valuable support agency fulfilling military research requirements, now NASA, elevated into the big league of government departments and agencies, with major budgetary demands of its own . . . loomed as a competitor for funds as well as for Presidential and public attention.”¹⁰² NASA *did* become an operating agency with its own contracting and management centers and was no longer simply an R&D organization supporting the DoD in a client-server relationship: “NASA became the biggest single rival and competitor of the mammoth Defense Establishment. It would not be, as NACA was,

⁹⁹ W. Fred Boone, *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32 (Washington, DC: USGPO, 1970), 6.

¹⁰⁰ Emme, *History of Space Flight*, 136.

¹⁰¹ Roy Johnson, ARPA Director. Memorandum to all ARPA staff, ARPA Policy Respecting DoD/NASA Relationships, October 14, 1958, SPI document 1439, pp. 1-3.

¹⁰² Richard Hirsch and Joseph Trento, *The National Aeronautics and Space Administration* (New York: Praeger Publishers, 1973), 30.

a research activity working mainly for the military. It would initiate its own programs, build its own facilities, develop its own procurement and management organizations."¹⁰³

The main bone of contention was, according to DDR&E Herbert York, "... this sort of basic conflict between NASA and ARPA about roles and missions at the high end, that is to say large rockets and men. Roy Johnson's view was that these were essential military activities, and Keith Glennan's view is that the Space Act of 1958 gave him a set of responsibilities to explore space and so forth, that it ought to be carried out with large rockets and men." York added he and Killian also believed, "It was NASA who needed men in space and who needed large rockets in order to carry out its mission, not ARPA."¹⁰⁴ As one scholar concluded, "ARPA and the services were fighting a lost battle. The President's policy of space for peace made him reluctant to grant any space activity to the military that could be considered of scientific interest."¹⁰⁵

ABMA as the Central Issue

Battles ensued nonetheless. The most important one centered on control of the Army Ballistic Missile Agency. The ABMA was one of two military organizations skilled in the design and construction (or managing the construction) of large rockets. The other was the USAF's Ballistic Missiles Division (BMD). Clearly, the administration would not permit NASA to take over BMD because it was responsible for the bulk of the United States ICBM deterrent force. ABMA was a different matter. Its main project was the huge Saturn rocket, an order of magnitude larger than any single ICBM. The DoD was unsure in late 1958 if there was any military requirement for such a large missile; in 1959 it would conclude there was not and the Saturn project along with most of ABMA would be transferred to NASA. For NASA the ABMA's capabilities were absolutely essential to the process of NASA becoming a viable space explora-

¹⁰³ Congress, House, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*, Thirteenth Report, 89th Cong, 1st Session, House Report No. 445, June 4, 1965, p. 12.

¹⁰⁴ Oral history interview of Herbert York, January 24, 1989, NASM, 43. York added, "There was very serious consideration at the top of the Air Force to changing their name to the United States Aerospace Force." Page 44.

¹⁰⁵ Gerald Cantwell, *The Air Force-NASA Relationship in Space, 1958-1968* (Washington, DC: Department of the Air Force, Office of Air Force History, October 1971, reprinted November 1990), 12.

tion agency; obviously, without the ability to construct the large rockets needed to launch heavy scientific payloads into earth orbit and into deep space, NASA's institutional capabilities would be extremely circumscribed.

Therefore, one of Glennan's first orders of business in the fall of 1958 was to petition for the transfer of the ABMA to NASA. The ultimate outcome of the complex bureaucratic maneuvering associated with the ABMA transfer throughout late 1958 and most of 1959 depended on Eisenhower. As early as March 1958 he stated he "... thought the Huntsville force [ABMA was located at the Army's Redstone Arsenal in Huntsville, AL] should be promoted to space and similar activities. He thought consideration should be given to taking them out of their present assignment and assigning them to ARPA, or even to NASA."¹⁰⁶ This was less than a week after approving Killian's memo recommending creation of a NASA and telegraphed the ultimate outcome of ABMA's transfer to NASA.

Glennan was on duty throughout September 1958 before NASA's official standing up on October 1st and toured DoD installations to determine their potential value to NASA. Concerning ABMA, "I became convinced that the talents of this group - so dedicated to space exploration and so hemmed-in by the fact that the Air Force had been given control of air and was intent on extending that control to space - would be a useful part of NASA." The obstacle would be the ABMA's commander, Major General John Medaris, who had treated Glennan "in a somewhat cavalier fashion." Glennan characterized Medaris as "a martinet, addicted to 'spit and polish,' never without a swagger stick, and determined to beat the Air

¹⁰⁶ Memcon, March 11, 1958, folder: Missiles, January-March 1958 (2), box 12, OSAF, White House Office, DDEL, 2.

Force. He simply did not have the cards."¹⁰⁷ Glennan felt he had the support of McElroy, Quarles, Roy Johnson and Herbert York. However, "I was not prepared for what then transpired."¹⁰⁸

Glennan proposed to Secretary of Defense McElroy on October 15, 1958 that DoD relinquish control of ABMA and JPL¹⁰⁹ because they are "vitally important to accomplishment of the NASA mission" and since current trends indicate "it may be expected soon that the major effort of ABMA will be in support of NASA programs." Therefore, "We believe that the transfer of the space capability of these organizations to NASA is in the national interest."¹¹⁰

Secretary of the Army Wilber Brucker called Glennan into his office and "became irate" at Glennan's transfer proposal and "said he could not countenance such a move." Glennan regretted that he "hadn't realized how much of a pet of the Army's von Braun and his operation had become. He was its one avenue to fame in the space business. . . . I finally left with my tail between my legs and called a session of our people to determine strategy." Brucker believed, "Currently, 85 percent of the existing capabilities at the Army Ballistic Missile Agency and the Jet Propulsion Laboratory are required for - and committed to - the Army's missile programs. . . . The damage done by disrupting the existing organization at this time would be irreparable The proposal to absorb at this time part of ABMA and to take over JPL is not in the national interest."¹¹¹ Brucker and Medaris leaked the situation to the press and

¹⁰⁷ Glennan, *Birth of NASA*, 9. One should note Glennan's candor in his diary. He repeatedly offered his honest assessments of the individuals with whom he came into contact, even if, as in this case, his opinions were disparaging. In another context he commented on Medaris, "I hope he gets into heaven, now that he's a priest." See Glennan oral history interview, May 29, 1987, NASM, 147: Glennan became an Episcopal priest after his retirement from the Army. This is important because he never spoke of any Air Force leaders in such terms. In fact he speaks fondly of Chief of Staff of the USAF General Thomas White throughout his diary and respectfully of General Schriever. This lends some credibility to the overall conclusion that while NASA and the Air Force had their points of difference during Glennan's tenure, the relationship was fundamentally sound.

¹⁰⁸ *Ibid.*, 10.

¹⁰⁹ The JPL was basically responsible for building the scientific payloads that the large rockets would launch. It was an Army facility managed under contract by the California Institute of Technology. The JPL would become the NASA laboratory responsible for the construction and operation of most of NASA's robotic planetary and deep-space probes.

¹¹⁰ Glennan, letter to McElroy, October 15, 1958, SPI document 488, pp. 2, 6.

¹¹¹ Wilber Brucker, Army Position Paper, October 15, 1958, folder: NASA/AOMC/JPL Transfer, box: Administrative History # 6, shelf VI-C-6, NHDRC, 1-2.

soon the entire situation became public knowledge.¹¹² By the end of October, "The President said that he is completely nonplused at the spirit of bureaucracy which seems to become predominant in such affairs - the lack of any spirit of give and take to try to work out the best national interest."¹¹³

Glennan quickly enlisted the assistance of Killian and Quarles and they soon hammered out a compromise solution whereby he agreed to drop his request for the ABMA and in return the Army did cede JPL to NASA and promised that the ABMA would be completely responsive to NASA work orders.¹¹⁴ However, as Glennan wrote McElroy, "We must recognize that as time passes important changes will undoubtedly occur in the nature of the requirements of both the Department of Defense and NASA." Therefore, the agreement called for a review and a report in one year "on the success of these arrangements."¹¹⁵ Eisenhower told Glennan he felt the partial transfer was a mistake because "he would prefer to make the ABMA shift right away" but was unwilling to intervene in the compromise solution his subordinates had crafted.¹¹⁶ Space Council meeting minutes reveal that most members felt that "Although the solution that is being recommended does not wholly meet NASA's needs, it is considered the best arrangement which can be achieved at this time."¹¹⁷ Glennan told Congress in January 1959 he was keeping

¹¹² Glennan, *Birth of NASA*, 10-11. In his memoirs Medaris describes the intentional leak. See *Countdown for Decision*, 243ff.

¹¹³ Memcon, October 31, 1958, folder: Staff Notes - October 1958, box 36, DDE Diary series. Ann Whitman file, DDEL, 1.

¹¹⁴ For full details see December 3, 1958, Cooperative Agreement on Army Ordnance Missile Command, Between the National Aeronautics and Space Administration and the Department of the Army, reprinted in the forthcoming Logsdon et. al., *Exploring the Unknown, Volume II: Relations with Other Organizations*.

¹¹⁵ Glennan letter to McElroy, December 1, 1958, SPI document 486, 2.

¹¹⁶ *Birth of NASA*, 12.

¹¹⁷ NASC, Minutes of Meeting, December 3, 1958, folder: National Aeronautics and Space Council (Unclassified) 1958," box: White House, National Aeronautics and Space Council, 1958-59, NHDRC, 1.

open all options: "I shall certainly avail myself of the opportunity, if I think I need it, to ask again for the transfer of this agency, if it seems important."¹¹⁸

Two developments helped secure the ABMA's transfer to NASA in 1959. First and most important was the OSD's conclusion that the Saturn rocket had no immediate military utility and was becoming too expensive, therefore they would not oppose its transfer along with that of the von Braun team developing it. Second, Glennan changed his tactics by waiting for the DoD to offer von Braun and the Saturn project to NASA, refusing to deal with Brucker, and dealing directly and only with OSD officials such as DDR&E York. Numerous sources indicate that in April 1959 York declared, "I have decided to cancel the Saturn program on the grounds there is no military justification."¹¹⁹ Kistiakowsky observed that Glennan and NASA were "... in constant jurisdictional conflict with the United States Army which, using Wernher von Braun and his rockets, was feverishly trying to carve a bigger role in space for itself."¹²⁰ In August 1959 an internal NASA document explained, "Recently, the Department of Defense has stated that due to budgetary limitations they would like to reopen the question of transferring the ABMA to NASA. . . . Army opposition can be expected to vary inversely as the amount of pressure applied by the Department of Defense."¹²¹

Glennan made sure DoD took the initiative for the transfer however, the memories of his 1958 experiences with Brucker still fresh in his mind. He recounted a discussion with McElroy in which McElroy "... was trying to find out whether or not we were sufficiently interested to make it worth his while to

¹¹⁸ Cited in Mary Stone Ambrose, *The National Space Program Phase II: Implementation of the National Aeronautics and Space Act of 1958: A Study of NASA's First Two Years of Operations with Emphasis on the Programming and Budgeting Aspects*, August 1960, folder: Implementation of the Space Act of 1958, box: White House, Presidents, Eisenhower, Space Act Testimony, NHDRC, 22.

¹¹⁹ York cited in Roger Bilstein, *Stages to Saturn: A Technological History of the Apollo-Saturn Launch Vehicles*, NASA SP-4206 (Washington, DC: USGPO, 1980), 39. See also Eugene M. Emme, "Historical Perspectives on Apollo," *Journal of Spacecraft and Rockets* 5 (April 1968): 372; and Charles D. Benson and William B. Faherty, *Moonport: A History of Apollo Launch Facilities and Operations*, NASA SP-4204 (Washington, DC: USGPO, 1978), 13.

¹²⁰ Kistiakowsky, *Scientist at the White House*, 10.

¹²¹ NASA, Considerations Preparatory to Establishing a NASA Position on ABMA, August 20, 1959, folder: NASA/AOMC/JPL Transfer, box: Administrative History # 6, shelf VI-C-6, NHDRC, 1.

move forward with his plan to carry out York's recommendations" to transfer Saturn and the ABMA to NASA instead of canceling it outright. Glennan said, "... the impression is left that this is a move on the part of Defense Department - not NASA. Naturally we are insisting that this is the posture."¹²² Glennan informed York on September 23, 1959 that NASA would be ready to reexamine the ABMA transfer question, "but on the basis that the initiative is being taken by Defense (recalling the very bad experience with the Army of last year.)" Glennan added, "The only way he would consider the take-over would be for Defense to propose it and to deliver the Army and Von Braun in support of the transfer."¹²³ Glennan stated in his memoirs, "I made it clear that I proposed to make a new deal, if any, only with the Office of the Secretary of Defense and that I expected Brucker to be told the results of the deal once it had been made."¹²⁴

By September 1959 Secretary of Defense McElroy reported that the DoD was negotiating to "... turn ABMA over to some agency other than the Army - probably NASA - since it was getting to expensive to support."¹²⁵ York explained, "We believe that we need the bigger boosters, but we do not at this time have firm requirements. For this reason, we would be satisfied to have NASA built the big boosters."¹²⁶ By September 29 any doubt as to the ABMA's future evaporated when Eisenhower stated that "... he didn't want the NASA budget to go much over half a billion dollars a year; that we weren't in a race with the Soviets, but were engaged in a scholarly exploration of space. He flatly stated that ABMA should be put under NASA and on my warning conceded that he will have to defend Glennan publicly." Soon, "Both Gates [new Secretary of Defense] and York conceded that personally they favored the transfer of

¹²² Glennan letter to Deputy Administrator Hugh Dryden, August 28, 1959, folder: Department of Defense Liaison, box: White House, Presidents, Eisenhower, DOD/CIA Information, NHDRC, 1.

¹²³ Memcon, September 21, 1959, *supra*, 2.

¹²⁴ *Birth of NASA*, 22.

¹²⁵ Memcon, September 16, 1959, folder: Department of Defense, Vol. III (8), box 2, Department of Defense subseries, Subject series, Office of the Staff Secretary, White House Office, DDEL, 1.

¹²⁶ Glennan, Notes on Discussion, How Important in the Current Scheme of things is the matter of competing in the Space Field aggressively and ultimately successfully with the Soviet Union, September 23, 1959, folder: Glennan Speeches and Congressional Statements, Glennan subseries, Administrators series, NHDRC, 2.

ABMA to NASA.¹²⁷ The only remaining task was drafting an official plan and submitting it to Congress. Brucker and Medaris realized they faced a *fait accompli* and so raised no serious objection. Eisenhower announced his intention to transfer most of the ABMA, essentially von Braun's team called the Development Operations Division, and the Saturn project, to NASA on October 21, 1959. The detailed NASA-DoD agreement was ready by December and the transfer became effective on March 14, 1960.¹²⁸

The entire ABMA transfer episode, which one historian termed the "most significant event in NASA's history" between its establishment and Kennedy's May 1961 lunar landing decision,¹²⁹ indicates the key role top OSD officials played in the overall NASA-DoD relationship. NASA might desire an organizational realignment such as the ABMA's transfer in 1958, but lacking top-level OSD backing it did not occur. The next year the ABMA was smoothly transferred to NASA because the DDR&E and Secretary of Defense concluded it was an organizational and financial liability to the DoD. The principle of OSD's input acting as a crucial determinant in the NASA-DoD relationship continued into the sixties in that the Air Force's drive for a human spaceflight mission would be largely circumscribed by OSD-level officials. Another legacy of the ABMA affair was that from the fall of 1959 on the Army no longer played any significant role in space and is largely absent from the remaining discussion of the NASA-DoD relationship. Logsdon explains that with the transfer of the von Braun team to NASA, "Army plans for manned space flight came to an end."¹³⁰

¹²⁷ Kistiakowsky, *Scientist at the White House*, 100, 111.

¹²⁸ The actual transfer document, "Agreement Between the Department of the Army and NASA on the Objectives and Guidelines for the Implementation of the Presidential Decision to Transfer a Portion of the ABMA to NASA" was dated November 16, 1959 and is reprinted in Congress, House, Committee on Science and Astronautics, *Transfer of the Development Operations Division of the Army Ballistic Missile Agency to National Aeronautics and Space Administration*, Hearings, 86th Congress, 2nd Session, February 1960, pp. 30ff.

¹²⁹ Robert L. Rosholt, *An Administrative History of NASA: 1958-1963*, NASA SP-4101, (Washington, DC: USGPO, 1966), 107.

¹³⁰ John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, MA: The MIT Press, 1970), 53.

ARPA's Space Role Faded

Autumn 1959 witnessed a second important organizational change relevant to the NASA-DoD relationship. ARPA also faded from importance in the space organizational scheme. While the DDR&E had already become OSD's pointman on space issues, ARPA's receding from the scene did mean the military space projects under its active management, such as the Sentry reconnaissance satellite, were returned back to the control of the individual military services. From this point forward NASA would interact directly with either the OSD or the Air Force in forging agreements or arranging project support, not ARPA. This reduction of ARPA's role apparently came at the initiative of DDR&E York and was motivated by the desire for even more centralized OSD-level control of military space projects:

It is rather clear that York intends to reduce the role of ARPA and restrict it to the field which is defined by its name. He wants to put all space activities directly into the Air Force except for specific missions to be assigned to the Army and navy, but even those are to use booster vehicles of the Air Force. He feels that making the program part of the Air Force budget will automatically restrain the wildest boys, whereas at present they simply write fantastic requirements and expect ARPA to take care of them.

Kistiakowsky agreed with York's initiative, saying, "We simply do not have the means to support all-out development efforts in all 'important' areas."¹³¹

Therefore on September 15, 1959 Eisenhower approved DDR&E York's memo transferring the various military space projects from ARPA back to the military services. Eisenhower seems to have been persuaded by Kistiakowsky's argument that farming the projects back out to the services would create a more clear-cut assignment of authority along reasonably functional lines, thereby reducing duplication. In addition, "Since the projects will be carried out on Service rather than ARPA budgets, a more effective restraint against indefinite multiplication and elaboration of projects will be established."¹³² The Air Force received management for the military reconnaissance satellite program (now called SAMOS) as well as the early warning against ballistic missile attack satellite called MIDAS, as well as another program called DISCOVERER to be discussed in the next chapter. The reorientation also granted the Air

¹³¹ Kistiakowsky, *Scientist at the White House*, 57-58.

¹³² Kistiakowsky, Memorandum to Staff Secretary Goodpaster, Coordination of Satellite and Space Vehicle Operations, folder: Kistiakowsky (2), box 23, Administration series, Ann Whitman file, DDEL, 1.

Force responsibility for developing all military boosters, integrating the satellite payloads with boosters, and launching the complete package. The Navy received developmental responsibility for a navigation satellite called TRANSIT and the Army received a family of communication satellites.¹³³ Clearly, the Air Force was consolidating its hold on the vast majority of military space responsibilities but would still be under close OSD-level scrutiny.¹³⁴ In February 1960 DDR&E York explained that as a result of these actions ARPA “. . . ceased to exist as an independent agency reporting to the Secretary of Defense. It no longer does play a role in the space program. . . . We have taken ARPA out of the programs which are virtually near the operational stage. . . .”¹³⁵

Amending the Space Act

Given the rationalization of organizational structure taking place in late 1959 within the military space context, it is reasonable to ask if a similar process had been taking place between the military and civilian space fields (beyond the ABMA transfer discussed above). Glennan had no serious complaints about the situation, expressing in a confidential setting, “I don’t mean to imply that the relationships between NASA and the Department of Defense have been anything but amicable. We have worked out our immediate problems in a cooperative spirit and, with the help of other agencies, have made reasonable

¹³³ For full details see Secretary of Defense McElroy, Memorandum for the Chairman of the Joint Chiefs of Staff, Subject: Coordination of Satellite and Space Vehicle Operations, September 18, 1959, reprinted in *Briefing Book for Air Force witnesses before the House Committee on Science and Astronautics on the Subject of DOD Space Directive 5160.32*, K160.8636-4, AFHSO, 1961.

¹³⁴ It should be noted that this same memorandum from McElroy to the Chairman, JCS, also rejected the official request the Army and Navy had made for creation of a joint, multi-service Defense Astronautical Agency to exercise control over all military space projects. Both services saw their input into and involvement with the military space environment slipping inexorably into the hands of the Air Force. This last-ditch attempt by the Army and Navy to maintain some active command role in military space projects was rebuffed by Secretary of Defense McElroy in the September memo and again by new Secretary of Defense Thomas Gates on June 16, 1960 when the Army and Navy renewed their request for a joint astronautical command. See, among others, Lee Bowen, *Threshold of Space: The Air Force in the National Space Program, 1945-1959* (Washington, DC: USAF HDLO, 1960), 31ff. The Army-Navy proposal is undated but probably summer 1959. General Proposal for Organization for Command and Control of Military Operations in Space, box 5, OASAT, White House Office, DDEL.

¹³⁵ Congress, Senate, Committee on Aeronautical and Space Sciences, Subcommittee on NASA Authorizations, *Transfer of the Von Braun Team to NASA*, H.J. Res. 567, 86th Congress, 2nd Session, February 18, 1960, 29-30.

progress."¹³⁶ Nevertheless, Glennan felt improvements to the Space Act's division of labor language were in order. Starting in mid-1959 he was the driving force behind an effort to amend the Space Act to more rationally reflect the actual relationship between NASA and the DoD. Ultimately this revised Space Act did pass the House in 1960 but Lyndon Johnson refused to permit its consideration in the Senate and so the legislation died. The incident does reveal important clues concerning Eisenhower's space policy.

In June 1959 Glennan wrote Killian with a proposed division of labor between NASA and the DoD the goal of which was to "... establish better criteria for allocation of effort." His plan was to specifically state that NASA had responsibility for: manned spaceflight and all manned satellites, laboratories, and interplanetary scientific exploration; all scientifically-oriented satellites, probes, sounding rockets, and vehicles; and development of applications satellites in the fields of communications, meteorology, geodetics, and navigation "in order to emphasize the intent and objective of this nation to devote space activities to peaceful purposes." DoD would be charged with developing and operating military weapons or support systems required for the defense of the United States, to include: military reconnaissance satellites (visual, electronic, photographic, and other); weapons delivery systems; and weapons defense and early warning systems.¹³⁷ There was no recorded presidential action until Glennan renewed his proposal in November 1959. However, Eisenhower did emphasize at a press conference, when asked why the ABMA had not been used to explore space, "I cannot, for the life of me, see any reason why we should be using or misusing military talent to explore the moon. This is something that deals in the scientific field. You have given to the military only what is their problem and not anything else. The rest of it stays under civilian control and that is the reason for having this agency [NASA]."¹³⁸

¹³⁶ NASC, Minutes of Meeting, March 2, 1959, folder: National Aeronautics and Space Council 1959, box: White House, National Aeronautics and Space Council, 1958-59, NHDRC, 1.

¹³⁷ Glennan, letter to James R. Killian, Jr., Mission Assignments in the Space Field, June 22, 1959, folder: PSAC Correspondence 1959, box: White House, President's Science Advisory Committee, NHDRC, 1-2. Note that when Glennan wanted to make this type of a proposal, he went through PSAC to gain the President's attention.

¹³⁸ Eisenhower, News Conference, November 3, 1959, *Public Papers of the President, 1959*, p. 278.

The CMLC and NASC

One prefatory note to the discussion of the effort to revise the Space Act is to mention that the two bodies Congress created to facilitate NASA-DoD coordination, the NASC and the CMLC, were not important policy making bodies during the Eisenhower administration. They were sufficiently superfluous so that Eisenhower recommended their abolition in his proposed Space Act amendments. In the case of the CMLC the central problem was its members' lack of authority; they could neither make nor enforce decisions because they did not hold positions of responsibility in either NASA or the DoD. Neither NASA nor DoD ever delegated any authority to it.

The CMLC's original charter of October 22, 1958 outlined its primary function: "Provide a channel for official advice, consultation and exchange of information and maintain a flow of this information adequate to keep. . . [NASA and DoD] fully and currently informed of each other's aeronautical and space plans, programs, and activities." Its authority was negligible: "When requested by the Administrator, National Aeronautics and Space Administration, or the Secretary of Defense, study and recommend courses of action where jurisdictional differences . . . have arisen, or might arise, unnecessary duplication of effort might develop, or coordination of jointly sponsored or related programs is required."¹³⁹ Thus CMLC Chairman William Holaday (its only full-time member) could not initiate any action unless requested by Glennan or McElroy (or Eisenhower's last Secretary of Defense Thomas Gates). By the CMLC's January 1959 meeting neither the OSD representative nor his alternate was present; two of four NASA members were absent and sent lower-ranking alternates. This pattern of either absence or sending subordinates was soon the norm.¹⁴⁰ Its March 1959 meeting agenda contained only one item, a NASA presentation on the national space vehicle program.¹⁴¹

¹³⁹ CMLC, Terms of Reference, October 22, 1958, folder: CMLC Organization and Membership, box: Civilian Military Liaison Committee, NHDRC, 2.

¹⁴⁰ Minutes of CMLC Meeting, January 13, 1959, folder: CMLC Minutes, January 1959, box: Civilian Military Liaison Committee, NHDRC, 1.

¹⁴¹ Minutes of CMLC Meeting, March 10, 1959, folder: CMLC Minutes, January 1959, box: Civilian Military Liaison Committee, NHDRC, 1.

The next month Chairman Holaday was candid with Congress, testifying that the CMLC was not "contributing much to the space effort," though he, the Secretary of Defense, and Glennan were trying to devise more useful functions. Holaday stated, "It is recognized that normal project activities can be conducted in a more expeditious manner if carried out a project officer to project officer level. . . ." ¹⁴² In July 1959 Holaday complained he was being completely cut out of the information exchange process between NASA and DoD: "The Chairman is finding it impossible to carry out his responsibilities due to lack of complete information on discussions and decisions that are being made by the separate offices." ¹⁴³ A Senate report the next month concluded, "The Civilian-Military Liaison Committee is not organized or authorized to perform effectively its coordinating functions between NASA and the Department of Defense. Coordination between NASA and the Department of Defense is being carried on by numerous and informal personal contacts. At times the Civilian-Military Liaison Committee is not even advised. . . . We have no authority." Holaday added, "If we do not get something more constructive to do than what the Committee is now doing, I can see no need for continuing the Committee" because its only current function was in the "exchange of mail" area, a post office. Glennan concurred: "They do not have any authority. It is entirely a communications channel." Glennan said he could do his job without it. ¹⁴⁴

The last of the CMLC's thirteen meetings was in December 1959. Before he resigned in April 1960, Holaday told Congress, "The formal actions of the Committee are few in number. . . . The role of the Committee has been of relatively minor importance. . . . A Committee, because of its usual composition, that is, a membership made up of representatives who are subject to a higher internal authority, is incapable of making firm decisions. . . . the activities of the Civilian-Military Liaison Committee are limited to recommended courses of action to the heads of the two agencies for their consideration and deci-

¹⁴² Holaday testimony on April 29, 1959, Congress, Senate, Subcommittee on Government Organization for Space Activities, Committee on Aeronautical and Space Sciences, *Investigation of Governmental Organization for Space Activities*, Hearings, 86th Congress, 1st Session, 1959, 504-05.

¹⁴³ Holaday, Memorandum for Record, Subject: Civilian Military Liaison Committee, July 22, 1959, folder: CMLC, box: Civilian Military Liaison Committee, NHDRC, 1.

¹⁴⁴ Congress, Senate, Subcommittee on Government Organization for Space Activities, Committee on Aeronautical and Space Sciences, *Government Organization for Space Activities*, Report No. 806, 86th Congress, 1st Session, August 25, 1959, pp. 4, 46-48.

sion.”¹⁴⁵ The CMLC faded from the scene, an organization that was created for the express purpose of coordinating the NASA-DoD relationship but which never had an impact on the relationship because it completely lacked any authority to take action.¹⁴⁶

Much the same story holds true for the role of the second organization expected to facilitate NASA-DoD interaction, the NASC. Eisenhower said he “. . . did not expect the Council to function too formally or elaborately.” He also indicated he would not hire an Executive Director for it or any full-time staff, “. . . indicating what he had in mind was someone to serve as a recording secretary rather than an Executive Secretary.” Eisenhower added the NASC should function “very much as a Board of Directors” considering only those issues brought to it by the NASA Administrator or the Secretary of Defense.¹⁴⁷ In 1959 when asked about the NASC’s ineffectiveness, Eisenhower simply replied “. . . that he had not sought the creation of the Space Council but had been forced to accept it as a compromise with the Democratic leadership.”¹⁴⁸ After Killian left the administration, the task of chairing NASC meetings fell to his replacement Kistiakowsky, who termed it “another useless job” that “spoils my plans for a week’s vacation.”¹⁴⁹ Not surprisingly, the NASC met only eight times between NASA’s establishment and its final meeting in January 1960. As with the CMLC, it exercised no important policy making role.¹⁵⁰ Eisenhower also recommended the NASC be abolished in his Space Act amendments.¹⁵¹

¹⁴⁵ Transcript of Holaday’s testimony before the House Committee on Science and Astronautics, March 10, 1960, folder: CMLC, box: Civilian Military Liaison Committee, NHDRC, 5-6.

¹⁴⁶ The CMLC was not legislatively and officially abolished until Reorganization Plan No. 4 of 1965. See NASA, *Aeronautics and Astronautics, 1965: Chronology on Science, Technology, and Policy* (Washington, DC: USGPO, 1966), 351.

¹⁴⁷ Memcon, September 25, 1958, from *The Diaries of Dwight D. Eisenhower, 1953-1961*, microfilmed from the Holdings of the Dwight D. Eisenhower Library, Robert Lester, Editor, part of the *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenburg, General Editor (Bethesda, MD: University Publications of America, 1986), as deposited in the LoC, reel 18, p. 1.

¹⁴⁸ Special Assistant for National Security Affairs Gordon Gray, Memorandum of Meeting with the President, August 3, 1959, dated August 5, 1959, folder: Meetings with the President: June-December 1959 (3), box 4, Presidential subseries, Special Assistants series, OSANSA, DDEL, 1.

¹⁴⁹ Kistiakowsky, *Scientist at the White House*, 46.

¹⁵⁰ While neither the CMLC or the NASC *made* policy during the Eisenhower administration, their records nevertheless are useful for the historian because they sometimes contain documents, reports,

Space Act Amendments Stymied

Glennan's drive for a revised Space Act containing a more realistic reflection of the NASA-DoD situation and eliminating the CMLC and NASC gathered momentum with a long memo he submitted to Eisenhower on November 16, 1959. Glennan began by discussing the CMLC and NASC, saying, "Neither of these activities has been particularly useful or effective. . . . it is doubtful that either of these agencies can usefully be employed in the management of the nation's space program." Second, he laid out what he felt DoD's position about space to be, namely, that "space is a place - not a program" and so ". . . space projects in the DOD are undertaken only to meet military requirements," not scientific research or exploration. Therefore, military space projects must compete with more conventional means of accomplishing the same or similar military objectives. In addition, Glennan now believed the Space Act needed no specific mention of what the DoD would do in space and what NASA would do in space because, "What the military needs to do in whatever medium . . . they can and should do under the statutory responsibilities for defending the nation" that already existed and needed no further addressing in the Space Act. Glennan's idea was to remove any specific tasking language for the DoD from the Space Act and simply allow DoD to act in space in accordance with legislation already tasking it to defend America, primarily the National Security Act of 1947.¹⁵²

Glennan explained his thoughts to senior NASA staffers after the first of the year: "There is no need for the 'except' clause in the law. The military services have all the authority they need to make use

statements, etc. from the agencies and persons who *were* making the important decisions and explaining in the context of an NASC or CMLC meeting why they had made a decision.

¹⁵¹ The NASC enjoyed a brief resurgence when Vice President Lyndon used it as the forum through which to conduct his investigation responding to Kennedy's April 1961 tasking asking how the US could beat the Soviets into space. Even in this instance, however, Johnson was clearly in control of the process and the NASC was largely a vehicle for his research. Subsequently, the NASC continued to meet throughout the Kennedy and Johnson administrations not as a policy making body but as a forum for discussion and exchange of ideas. Its records do, therefore, contain some important documents, even though the NASC did not technically make policy or decisions. Richard Nixon abolished the NASC in Reorganization Plan No. 1 of April 1973. For a good sketch of the NASC's history see Dwayne A. Day, "Space Policy-Making in the White House: The Early Years of the National Aeronautics and Space Council," in Roger Launius, editor, *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, AAS History Series volume 18 (San Diego, CA: Univelt, Inc., 1995).

¹⁵² Glennan memorandum to Eisenhower, November 16, 1959, reprinted in Glennan, *Birth of NASA*, 24-29.

of the space environment to satisfy military requirements.” His changes would eliminate the ‘except’ clause “. . .with the statement that nothing in the Act prevents them from using the space environment to satisfy military requirements. This has been done in order that the responsibility for the nation’s space ‘exploration’ program may be given to NASA. . . . It places responsibility squarely where it should be placed. It protects the right of the DOD to utilize the space environment for military purposes.”¹⁵³ Secretary of Defense Thomas Gates agreed with Glennan’s changes, saying they “made a good deal of sense from a management standpoint” and “the law should have been written this way in the first place.”¹⁵⁴

When Glennan and Eisenhower met with Senate leaders to sell their proposed Space Act revisions Glennan explained “. . . that the difficulties between the Defense Department and NASA began to disappear approximately four months ago. . . . The President commented that the Defense Department is satisfied with the proposed agreement. Lyndon Johnson promised that if the President wanted to do away with the CMLC and NASC “I’m certain it will be all right with me” and that he would begin hearings later in January 1960.”¹⁵⁵ Neither of these Johnson statements was true. In a meeting the next day with House leaders Glennan averred “. . . that for the past four or five months the military and civilian activities have become almost entirely separated.” In addition, “The President said Dr. York had explained that the present need between NASA and Defense is simply to get information from one to the other.”¹⁵⁶

On January 14, 1960 Eisenhower publicly released and explained his proposed amendments to the Space Act designed to “clarify management responsibilities and to streamline organizational arrangements concerning the national program of space exploration.” In addition to deleting the CMLC and

¹⁵³ Glennan memorandum to NASA senior leadership, January 2, 1960, *supra*, 1.

¹⁵⁴ Cited by Glennan, *The Birth of NASA*, 33.

¹⁵⁵ See *ibid.*, 46 and Bryce Harlow, Memorandum for Record, Subject: January 13, 1960 meeting of the President with Styles Bridges, Glennan, and Lyndon Johnson, folder: Staff Notes - January 1960 (2), box 47, DDE Diary, Ann Whitman file, DDEL, 2-4.

¹⁵⁶ Bryce Harlow, Memorandum for Record, Subject: January 14, 1960 Meeting with Overton Brooks, John McCormack, Joe Martin, and Glennan, *ibid.*, 1-3.

NASC clauses, the new Space Act would also eliminate the 'exception' clause. These changes would eliminate the provisions of the old Space Act which

tend[ed] to obscure the responsibility of NASA for planning and directing a national program of space exploration and peaceful space activity. For example, there is inherent in it [old Space Act] the concept - which I believe to be incorrect - of a single 'comprehensive program' of space activities embracing both civilian and military activities, and it implies that a multiplicity of unnamed agencies might have responsibility for portions of such a program. . . . I have become convinced by the experience of the past fifteen months since NASA was established that the Act needs to be amended so as to place responsibility directly and unequivocally in one agency, NASA, for planning and managing a national program of nonmilitary space activities. . . . In actual practice, a single civil-military program does not exist and is in fact unattainable; and the statutory concept of such a program has caused confusion. The military utilization of space, and the research and development effort directed toward that end, are integral parts of the total defense program of the United States. Space projects in the Department of Defense are undertaken only to meet military requirements.

Eisenhower went on to say that the DoD had ample authority outside the Space Act to do R&D on space systems and to use space for defense purposes, "and nothing in the Act should derogate from that authority." But, "The statute should go no further than requiring that NASA and the Department of Defense advise, consult, and keep each other fully informed with respect to space activities . . . it should not prescribe the specific means of doing so."¹⁵⁷

This message has been cited extensively because it reveals two important points about the Eisenhower administration's space policy. First, it regarded the NASA and DoD space programs as two separate entities, not as subcomponents of one overall program. The Kennedy-Johnson administrations would take exactly the opposite approach under McNamara's management philosophy of eliminating redundancy and duplication in pursuit of efficiency. Second, Eisenhower made clear that military space projects would be authorized only if there was a definitely identifiable and specific requirement for it. On this point, the Kennedy-Johnson policy would be the same.

The House considered and passed on June 9, 1960 Eisenhower's new Space Act with one major change: it added an Aeronautics and Astronautics Coordinating Board (AACB) to take the place of the CMLC. However, it was expected that the AACB's members would be high-ranking officials from NASA and the DoD who would be able to speak with authority, make decisions, and return to their respective

¹⁵⁷ Eisenhower, Special Message to the Congress Recommending Amendments to the National Aeronautics and Space Act," January 14, 1960. *Public Papers of the President, 1960-1961*, pp. 34-36.

organizations and enforce the AACB's decisions. The House also inserted a phrase to protect the DoD's interests: "The Department of Defense shall undertake such activities in space, and such research and development connected therewith, as may be necessary for the defense of the United States."¹⁵⁸

Lyndon Johnson, however, refused to let the Senate consider the legislation. Glennan recounts Johnson told him on June 23, 1960, "Look now, doctor, you haven't a chance to get that legislation. . . . I don't see any reason for giving you a new law at the present time. If I am elected president, you will get a changed law without delay."¹⁵⁹ Johnson's entry into the *Congressional Record* was more diplomatic: "Analysis of the key issues involved fails to uncover any persuasive reasons for pressing for Senate action on these amendments. . . . One fact is of overriding importance. A new President will take office on January 20, 1961. The next President could well have different views as to organization and functions of the military and civilian space programs. Any changes in the Space Act at this session . . . could restrict the freedom of action of the next President."¹⁶⁰

The AACB

Therefore, the only result of consequence from the attempt to revise the Space Act throughout late 1959 and 1960 was the AACB. The AACB would function throughout the 1960s with a higher degree of importance than the CMLC. It and its six panels¹⁶¹ met regularly not to engage in the policy making function but to ensure proper coordination between the NASA and DoD efforts in particular space technology fields. Any decisions concerning improving coordination or reducing duplicative effort were usually carried out because the AACB's co-chairmen were NASA's Deputy Administrator (number two in the NASA hierarchy) and the DDR&E (responsible for all DoD R&D, engineering, and technical activities). The AACB's charter explained it was "essential" to coordinate space activities of NASA and the

¹⁵⁸ Congress, House, Committee on Science and Astronautics, *Amending the National Aeronautics and Space Act of 1958*, Report No. 1633, 86th Congress, 2nd Session, March 1960, pp. 5-6.

¹⁵⁹ Cited by Glennan, *Birth of NASA*, 171.

¹⁶⁰ Lyndon Johnson, Memorandum on Proposed Amendments to the Space Act, HR 12049, reprinted in *Congressional Record*, August 31, 1960, p. 18508.

¹⁶¹ Manned Space Flight, Unmanned Spacecraft, Launch Vehicles, Space Flight Ground Environment, Supporting Space Research and Technology, Aeronautics.

DoD. Therefore, "Where policy issues and management decisions are not involved, it is important that liaison be achieved in the most direct manner possible, and that it continue to be accomplished as in the past between project-level personnel on a day-to-day basis." The AACB existed simply to identify any problems in this area and ensure that exchange of information "... be facilitated between officials having the authority and responsibility for decisions within their respective offices."¹⁶²

As the NASA Co-Chairman, Hugh Dryden explained, "In the case of the AACB, the Co-Chairmen, being placed at a very high level in their respective organizations, can, indeed, arrive at decisions regarding a great many interagency problems and proceed to carry them out."¹⁶³ This change in the nature of the leaders and members of the AACB when compared to the CMLC would be the difference enabling the AACB to act as an effective mid-level coordinating entity throughout the 1960s. Policy, of course, continued to originate at higher levels. However, Logsdon's assessment is also relevant: "... as the separate NASA and defense programs became more institutionalized in the 1960s and 1970s, there has been a tendency for coordination between the programs to be defensive in character, i.e., aimed at protecting each agency's own programs and 'turf.'"¹⁶⁴

The NASA-DoD Relationship II

This raises the question of what were some of the points of cooperation, support, and rivalry that did exist between NASA and the DoD during Eisenhower's term apart from the division of labor/ABMA issues discussed above? How did the multifaceted pattern of assistance and conflict emerge? Most of these questions tend to involve NASA and the Air Force because, as explained above, the Air Force be-

¹⁶² NASA-DoD Agreement on the AACB, September 13, 1960, as reprinted in Congress, House, Subcommittee on NASA Oversight, Committee on Science and Astronautics, *The NASA-DOD Relationship*, Report, 88th Congress, 2nd Session, 1964, pp. 10-11.

¹⁶³ NASA, Minutes from the Williamsburg Conference, October 21, 1960, folder: Aeronautics and Astronautics Coordinating Board, box: Aeronautics and Astronautics Coordinating Board, NHDRC, 1.

¹⁶⁴ John Logsdon, "Opportunities for Policy Historians: The Evolution of the U.S. Civilian Space Program," in Alex Roland, editor, *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405 (Washington, DC: USGPO, 1985), 94.

came the agency responsible for conducting most of the DoD's space program after ARPA receded from the scene.

One illustrative early example of USAF-NASA tension centers on the Agena upper stage vehicle.¹⁶⁵ The Agena began as the upper stage for the Air Force's reconnaissance satellite and so was part of the 117L program when the original contract went to Lockheed in 1956.¹⁶⁶ However, the Air Force failed to inform NASA of the existence of the Agena program in late 1958, for what one source terms "reasons of 'national security'"¹⁶⁷ when NASA and the DoD were supposed to be coordinating their overall launch vehicle programs so as to avoid duplication. As a result, NASA began an entirely separate upper stage project called Vega that had very similar performance characteristics when compared to Agena. Nowhere in the official NASA-DoD report on launch vehicles from January 1959 is the Agena's existence mentioned; the Vega is, however, extensively discussed.¹⁶⁸ However, at some point between January and September 1959 (one source says May¹⁶⁹) NASA did become aware of Agena's existence and pressure grew for NASA to cancel Vega. A September 30, 1959 report said the United States' fleet of launch vehicles was basically sound, except the Agena should replace the Vega for NASA use.¹⁷⁰

¹⁶⁵ Lower stage vehicles are those designed to lift a rocket and its payload off the ground and through the dense lower portions of the earth's atmosphere. Upper stage vehicles are designed to insert the payload into its final orbit and to maneuver it once it is there, or, alternatively, to boost the payload to such a velocity that it can escape the earth's atmosphere and begin its flight into interplanetary space.

¹⁶⁶ Herbert York, *Race to Oblivion: A Participant's View of the Arms Race* (New York: Simon and Schuster, 1970), 105; and Hall, "Origins of U.S. Space Policy," 223.

¹⁶⁷ R. Cargill Hall, "Civil-Military Relations in America's Early Space Program," a paper delivered September 21, 1995 at a symposium sponsored by the Air Force Historical Foundation, *The USAF in Space: 1945 to the Twenty-First Century*, Andrews AFB, MD, 12.

¹⁶⁸ NASA, *A National Space Vehicle Program: A Report to the President*, January 27, 1959, folder: NASC Papers (1), box 5, OCB Secretariat Series, NSC Staff series, White House Office, DDEL.

¹⁶⁹ R. Cargill Hall, *Lunar Impact: A History of Project Ranger*, NASA SP-4201 (Washington, DC: USGPO, 1977), 23.

¹⁷⁰ William Holaday, Memorandum for the Secretary of Defense and NASA Administrator. Subject: A National Space Vehicle Program, September 30, 1959, folder: CMLC, box: Civilian Military Liaison Committee, NHDRC, 1-5.

Glennan had to then inform Eisenhower that "... there has apparently been a departure by the Department of Defense from the President's instruction that 'no substantial changes in the program presented early in the year are to be made without specific Presidential approval.' The Defense Department initiated a project named AGENA, which substantially duplicates NASA projects. They have gone so far with contracting and actual work under the project that to cancel it now would save very little money. . . . The President said he thought he had cleared up such duplications. Dr. Glennan said he thought so too."¹⁷¹ After Eisenhower noted "... that coordination in matters of this sort should occur before millions of dollars are committed," he "... requested the Administrator, NASA, and the Secretary of Defense develop a scheme that would further coordination and, where possible, meld the NASA and Defense contributions to the National Space Vehicle program."¹⁷² Kistiakowsky recorded that Eisenhower was "obviously very angry" about the Agena-Vega duplication "and made references to subordinates disobeying orders in connection with this duplication."¹⁷³ NASA canceled the Vega on December 11, 1959. The DoD and Air Force appeared to have been sufficiently chastised because there are no other recorded incidents of such blatant duplication resulting from a failure by the DoD to inform NASA about the status of its programs. One source calculated the duplication cost \$16 million.¹⁷⁴ In the future, the AACB's Launch Vehicle Panel ensured NASA and DoD had a forum wherein each could be promptly informed of the other's launch vehicle work.

The Agena-Vega episode was not the only indication of rivalry in the NASA-DoD/USAF relationship. Certainly the Air Force was none too pleased to have lost some of its space responsibilities and projects to NASA. Vice Chief of Staff of the Air Force (the service's second-highest ranking officer) Curtis LeMay, shortly after NASA's creation, "... complain[ed] forcefully about the lack of military input

¹⁷¹ Memcon, October 26, 1959, dated October 30, 1959, folder: Staff Notes - October 1959 (1), box 45, DDE Diary series, Ann Whitman file, DDEL, 1.

¹⁷² NASC, Minutes of 7th Meeting, October 26, 1959, folder: 7th Meeting, box 2, RG 220, NARA, 3.

¹⁷³ Kistiakowsky, *Scientist at the White House*, 128.

¹⁷⁴ Paul Means, "Vega-Agena-B Mix-Up Cost Millions," *Missiles and Rockets* (June 20, 1960): 19.

into the new NASA and to assert that in his opinion the manned satellite project would be delayed by a year or more" as a result of its transfer to NASA.¹⁷⁵ Some Air Force leaders resented the fact that large numbers of Air Force officers were transferred to NASA so that their management skills, acquired in USAF ballistic missile and space programs, could be used on NASA projects because NACA personnel lacked such experience. Some aspects of this Air Force personnel transfer to NASA gave rise to one of the most celebrated instances of supposed USAF-NASA tension of the Eisenhower administration.

Until early 1960 Air Force officers were being transferred to NASA as individuals and the Air Force honored virtually all NASA requests. But during the last year of the Eisenhower administration NASA starting requesting entire project teams be transferred from Air Force projects to NASA. For instance NASA requested in April that the entire Project Centaur (another Air Force upper stage vehicle) management team consisting of a colonel, a lieutenant colonel and three majors be transferred to NASA. The Air Force's Deputy Chief of Staff for Development wrote the Chief of Staff that "... the USAF just can't afford a continued dissipation of its in-service technical capability. . . . I recommend that the Air Force resist the reassignment of the officers in question."¹⁷⁶ Schriever also explained he deeply regretted the loss of several key individuals from his command such as Major General Don Ostrander, whom Schriever "considered to be greatly needed for his own developmental programs"¹⁷⁷ and who had become chief of NASA's launch vehicle programs. In this context of increasing resistance to NASA personnel requests, Chief of Staff General White decided the time was right for a "sermon from the Chief of Staff to his staff" because he believed the USAF had to continue to support NASA to the absolute limits of the USAF's ability.¹⁷⁸

Therefore, White wrote his subordinates on April 14, 1960

I am convinced that one of the major long range elements of the Air Force future lies in space.

¹⁷⁵ Clotaire Wood, Memorandum for Glennan, October 29, 1958, folder: Air Force Space - AFCHO, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁷⁶ Lieutenant General Roscoe C. Wilson, letter to General Thomas White, April 7, 1960, folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas D. White papers, LoC, 1.

¹⁷⁷ Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic thinking in the United States Air Force, 1907-1960, Volume I* (Maxwell AFB, AL: Air University Press, 1989), 604.

¹⁷⁸ Ibid.

It is also obvious that NASA will play a large part in the national effort in this direction and, moreover, inevitably will be closely associated, if not eventually combined with the military. It is perfectly clear to me that particularly in these formative years the Air Force must, for its own good as well as for the national interest, cooperate to the maximum extent with NASA, to include the furnishing of key personnel even at the expense of some Air Force dilution of technical talent. . . . I want to make it crystal clear that the policy has not changed and that to the very limit of our ability, and even beyond it to the extent of some risk to our own programs, the Air Force will cooperate and will supply all reasonable key personnel requests made on it by NASA.¹⁷⁹

The "eventually combined with" phrase was later taken out of context in an attempt to prove the Air Force was engaged in some type of a "campaign" to usurp NASA's authority. When this was investigated in the early Kennedy administration, White had to carefully explain this was not the case by emphasizing the context of the letter was to ensure his subordinate generals were unequivocally clear that they would continue to honor NASA personnel requests. White told Congress, "The sole purpose of this memorandum - and I think I stated it very clearly - is that I want to make it crystal clear that the policy is we will cooperate with NASA - and to the very limit of our ability and even beyond, to the extent of some risk in our own programs." When asked if he had any thoughts of taking over any portion of NASA's mission, White responded, "Absolutely not. None then [April 1960], none now [March 1961], and I know of no one else who has contrary views in the Air Force. I would like to point out that this is not a statement of advocacy, but a statement of possible fact. . . . No planning whatsoever."¹⁸⁰ Indeed, when asked at the same hearings if the military should take over any part of NASA, Kennedy's Deputy Secretary of Defense Roswell Gilpatric replied, "We have plenty of problems today. We don't need any more."¹⁸¹

The Air Force certainly should have been more careful with some of its public relations/public affairs type of activities. Chapter seven will examine in detail the supposed Air Force "campaign" during the Eisenhower-Kennedy interregnum. The fundamental point, however, is that while the Air Force was clumsily ham-handed in attempting to create a greater awareness of its space capabilities, there was

¹⁷⁹ CSAF Thomas White, letter to Generals Landon and Wilson, Air Force Deputy Chiefs of Staff for Personnel and Development, with copies to Schriever and LeMay, among others, April 14, 1960, folder: Civilian vs. Military Role in Space, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁸⁰ Congress, House, Committee on Science and Astronautics, *Defense Space Interests*, Hearings, 87th Congress, 1st Session, March 1961, pp. 92-93.

¹⁸¹ *Ibid.*, 35.

probably no orchestrated drive to shut down NASA and take over its civilian space exploration and experimentation programs. Glennan wrote he did not believe the Air Force wanted to take NASA over but that "... the blatant nature of its propaganda is a little bit disturbing to me."¹⁸² Glennan even met with the top USAF civilian and military leaders in December 1960

to try to find out whether or not there was anything seriously wrong between NASA and the Air Force. The publication of stories of strife, vying for position, stealing each other's projects, etc. have been very frequent these past two or three weeks. It was a pleasant discussion with much agreement on both sides. Certainly at the top of our organizations there is no real difference or need for concern. I am sure, however, at the 'colonel' level, there is a good deal of envy and flexing of elbows.¹⁸³

Accusations of Air Force poaching on NASA's territory clearly made good newspaper copy but were not supported by NASA's top official. Glennan later summarized with the exception of the ABMA affair, "I had no real battles, very little trouble with the Pentagon actually. Sometimes members of the staff locked horns with somebody over there, but I'd go see Jim Douglas [Secretary of the Air Force, May 1957 to December 1959] or Tommy White for five minutes" and the problems would be solved.¹⁸⁴

This is not to say there was not rivalry between NASA and the Air Force. Perhaps this was inevitable. One political scientist explains that any new and rapidly expanding bureaucracy will "... soon engender hostility and antagonism from functionally competitive bureaus. Its attempt to grow by taking over their functions is a direct threat to their autonomy. Hence the total amount of bureaucratic opposition to the expansion of any one bureau rises the more it tries to take over the functions of existing bureaus."¹⁸⁵ For instance, Hall maintains the loss of many space-related projects to NASA particularly galled the Air

¹⁸² Glennan, *Birth of NASA*, 224.

¹⁸³ Ibid., 284. The 'colonel' reference is an allusion to the fact that within the military the colonels tend to be the highest-ranking members of the teams who actually work on a particular project in the sense of supervising its day-to-day management and operation. Colonels as a general rule, however, do not get involving in the higher-level policy making decisions such as how NASA and the Air Force would interact as agencies. Such policy issues would be settled by the higher-ranking generals and civilian executive branch presidential appointees.

¹⁸⁴ Oral history interview of Glennan, April 5, 1974, folder: Glennan Interview 4/5/74, Glennan subseries, Administrators series, NHDRC, 9.

¹⁸⁵ Anthony Downs, *Inside Bureaucracy* (Boston: Little, Brown and Company, 1967), 64.

Force. "... which still nursed a deep resentment over a civilian space agency's preempting a field it called its own."¹⁸⁶ Another Air Force historian added. "As a new government agency, NASA had the normal human and institutional instinct to build an empire and reach out for control of all space vehicles."¹⁸⁷ Air Force frustration could flare over seemingly minor issues. NASA did not permit Air Force officers on duty at NASA to wear their uniforms, causing retired Chairman of the JCS Nathan Twining to lament. "Yet these regular career men have to go around in semi-masquerade as civilians. In this regard I feel that as a nation we went overboard in our efforts to show peaceful intent."¹⁸⁸

Similarly, the Air Force felt slighted because it believed NASA was not keeping it adequately informed on NASA's growing lunar studies while the Air Force did regularly brief NASA on USAF lunar studies.¹⁸⁹ For instance, NASA formed a working group to prepare a lunar exploration program that included JPL, ABMA, and the California Institute of Technology, but not the Air Force. On April 17, 1959 NASA announced plans for long-range scientific exploration of the moon, much to the USAF's surprise. That same month NASA responded to an Air Force briefing on the status of the USAF's strategic lunar system studies by declaring that the lunar area was "exclusively NASA property." Some within the Air Force felt that NASA also took over the Air Force's nascent human spaceflight program with no acknowledgment of indebtedness. One Air Force historian summarized, "NASA's uncooperative attitude in the lunar field became more noticeable. . . . the developing relations was discouraging." Another emphasized, "NASA was kept informed of progress but seemed less and less inclined to reciprocate. Gradually a background of unhappy incidents in NASA-USAF relations built up. . . . This far-from-cooperative attitude by NASA in the lunar field became more noticeable as weeks passed, and it came to cover much wider areas."¹⁹⁰

¹⁸⁶ Hall, *Lunar Impact*, 27.

¹⁸⁷ Cantwell, *The Air Force-NASA Relationship in Space*, 16.

¹⁸⁸ Nathan Twining, *Neither Liberty Nor Safety* (New York: Holt, Rinehart and Winston, 1966), 291.

¹⁸⁹ This paragraph based on Cantwell, *The Air Force-NASA Relationship in Space*, 10, and Bowen, *An Air Force History of Space Activities*, 159-161.

¹⁹⁰ Bowen, *An Air Force History of Space Activities*, 160.

Part of the problem was traceable to an issue from the previous chapter: the fundamental difficulty and perhaps impossibility of crafting a neat division between the civilian and military uses and responsibilities in space given the similarity of technology used in each. Since there were large and unavoidable gray areas of overlap, "There were endless opportunities for disagreements and rivalries that at any time might delay projects of vital interest to the United States." From the Air Force's perspective, "To have the space program taken over by ARPA was a serious blow, and to have the program divided again with NASA was yet more disturbing. . . . the leaders of the civilian agency thought neither in terms nor interests of the military but pursued space flight and space exploration as ends in themselves. Yet national defense was at stake." Nevertheless, the Air Force was savvy enough to know that cooperation with NASA was in its best interests because in the long run the United States would develop the building blocks of space technology, albeit in NASA instead of the Air Force: "There were of course occasions of misunderstanding, but the Air Force kept its goal of cooperation."¹⁹¹

It becomes apparent that the concrete areas of DoD/AF support of and coordination with NASA were more important than the areas of rivalry or tension described above. Many Air Force officers served in NASA, thereby giving it vital leadership experience in large project management which NACA personnel simply lacked and that NASA could obtain from no other source: "When NASA was established, the only persons with experience in the kinds of projects the agency was expected to implement were officers involved in weapons systems development."¹⁹² This flow of needed individuals was codified in an April 13, 1959 NASA-DoD agreement that laid out the bureaucratic procedures for the three-year assignments, with a one-year extension possible.¹⁹³ When NASA lost Richard Horner as Associate Administra-

¹⁹¹ Bowen, 123, 155.

¹⁹² Levine, *Managing NASA in the Apollo Era*, 122. For instance, General Samuel Phillips would become Director of the Apollo Program and perform in such a superb manner that NASA called him back after the Challenger disaster of January 1986 to conduct an investigation of the accident; Major General Donald Ostrander headed up NASA's launch vehicles programs; Major General James Humphreys would become NASA's Director of Space Medicine; Brigadier General Edmund O'Connor was Marshall Space Flight Center's Director of Industrial Operations; Brigadier General C.H. Bolender was Program Director for Apollo's lunar module. From p. 122 also.

tor, its number three position, Glennan had difficulty securing another quality individual. He went to CSAF White, who "... promised that we would have our choice of three or four on very short notice although he fully agreed with us that we ought to bend every effort toward getting the civilian."¹⁹⁴ Glennan was able to hire a civilian, Robert C. Seamans. Long term figures for military personnel assigned to NASA were:¹⁹⁵

<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
66	67	77	117	161	239	249	280	323	318	317	268

Another type of support alluded to already was the family of ballistic missiles the DoD made available to NASA to use as space launchers. After all, "A launch vehicle is only a modified ballistic missile; and it cannot be overstated that for everything between sounding rockets and the Saturn I, NASA relied on vehicles successfully developed by the Air Force- between 1954 and 1959," particularly the Atlas, Thor, and Titan.¹⁹⁶ NASA's launch vehicle dependence included relying on use of Air Force's launch facilities at Cape Canaveral on Florida's east coast and on the DoD's extensive worldwide network of tracking and data acquisition stations. The Navy entered the support picture because its ships were used in the process of recovering astronauts returning from orbit. NASA's Associate Administrator Seamans quipped, "The Navy fell into this quite gladly. They didn't mind the visibility of having admirals greet astronauts when they arrived from the moon."¹⁹⁷ The Army's role in support came largely through its Corps of Engineers. NASA relied on the Corps for designing and constructing the mammoth rocket

¹⁹³ See Agreement between the Departments of Defense, Army, Navy and Air Force and the NASA Concerning the Detailing of Military Personnel for Service with NASA, April 13, 1959, SPI document 1537.

¹⁹⁴ Glennan, *Birth of NASA*, 171.

¹⁹⁵ Jane Van Nimmen, Leonard C. Bruno, Robert Rosholt, *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 80ff. 1969 figure from Ihor Gawdiak and Helen Fodor, *NASA Historical Data Book, Volume II: NASA Resources, 1969-1978*, NASA SP-4012 (Washington, DC: USGPO, 1994), 68.

¹⁹⁶ Levine, *Managing NASA in the Apollo Era*, 212.

¹⁹⁷ Oral history interview of Robert C. Seamans, September 1973-March 1974, K239.0512-687A, AFHRA, 539. Declassified at author's request.

stands, huge launch complexes, providing ship transportation, etc. during NASA's rapid period of expansion in the late 1950s and early 1960s, "one of the wiser decisions in this hectic period."¹⁹⁸ In addition, given the NACA's experience with contracting and procurement, NASA conducted its operations in these areas in accordance with the Armed Services Procurement Regulation.¹⁹⁹ The areas of support the DoD, and in particular the USAF, granted NASA in its early years were of undeniable importance in NASA becoming a viable organization and NASA's ability to conduct a robust civilian space program.

In addition to support, coordination was an important element of NASA-DoD interaction. The AACB's creation in the spring of 1960 provided a formal structure to the day-to-day coordination that had been taking place on myriad NASA-DoD topics since NASA's establishment. There were also numerous committees, ad hoc groups, and project-level consultations that greased the cogs of America's space program and the civilian-military interaction within it. In NASA's very first month there were 13 separate committees devoted to coordinating R&D topics between the two organizations.²⁰⁰ As the AACB's six panels matured, they tended to form even more specialized subpanels to ensure that NASA and DOD were reciprocally informed as to the other's activities in virtually every area of project development and facility construction. As Glennan told a House member in April 1960, "It seems clear to me that separate but closely related and properly coordinated management of military and non-military space activities is the sound procedure to be followed. . . . It is my conviction that we are well on the way to achieving a satisfactory management-level coordination that will work."²⁰¹

¹⁹⁸ Roger E. Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990*, NASA SP-4406 (Washington, DC: USGPO, 1989), 60.

¹⁹⁹ NASA, Agreement Between the Department of the Air Force and the National Aeronautics and Space Administration Concerning Air Force Assistance to NASA in the Procurement of Research and Development and/or the Performance of Field Service Functions, October 15, 1959, folder: Copies of Agreements, DoD subseries, Federal Agencies series, NHDRC.

²⁰⁰ Glennan, letter to all military service secretaries and Deputy Secretary of Defense Gates, October 31, 1958, folder: Organizational Developments - 1958 Miscellaneous, box: Administrative History # 6, shelf VI-C-6, NHDRC, 1-2. These committees were Fluid Mechanics, Aircraft Aerodynamics, Missile and Spacecraft Aerodynamics, Control Guidance and Navigation, Chemical Energy Processes, Nuclear Energy Processes, Mechanical Power Plant Systems, Electrical Power Plant Systems, Structural Loads, Structural Design, Structural Dynamics, Materials, and Aircraft Operating Problems.

²⁰¹ Glennan letter to Representative James M. Quigley, April 4, 1960, folder: April 1960, Chronological, Glennan subseries, Administrators series, NHDRC, 4.

It comes as no surprise that with such an extensive network of interagency committees, inter-agency agreements and memoranda of understanding would proliferate. One government report from 1965 lists 88 separate "major" NASA-DoD agreements.²⁰² A comprehensive NASA accounting from 1967 lists 176 NASA-DoD accords.²⁰³ One of the most important of these agreements from the perspective of later developments would be the one concerning how the two agencies would reimburse each other for services rendered. The November 1959 agreement on this subject basically stated that if the DoD received an order from NASA which the DoD had to then subcontract out, NASA would only have to reimburse the direct cost of the subcontract; there would be no overhead or administrative charges. If the DoD had the capability to fulfill the contract at one of its facilities, NASA's costs would be limited to the costs directly attributable to performance of the contract; there would be no charges for depreciation, rent, overhead, etc.²⁰⁴ No attempt at coordinating two large programs such as the civilian and military space programs could have completely eliminated all traces of duplication and waste. Nevertheless, it appears NASA and the DoD made a good faith effort to reduce inefficiencies to a minimum.

The overall NASA-DoD situation in the Eisenhower administration was therefore a complex mixture of support, coordination, and rivalry in which no one facet predominated over the others. Glennan told the Senate six months into his tenure, "NASA and the military have functioned without undue friction or duplication of effort. . . . We are facing the same management problems confronting any large government or industrial complex. . . . Thus far, there have been no instances in which reasonable solutions to questions of jurisdictions have been impossible to reach."²⁰⁵ In private sessions with Eisenhower,

²⁰² *Government Operations In Space*, supra, 123-132.

²⁰³ NASA, Inventory of NASA Interagency Relationships, October 13, 1967, folder: Copies of Agreements, DoD subseries, Federal Agencies series, NHDRC.

²⁰⁴ DoD, Agreement Between the Department of Defense and National Aeronautics and Space Administration Concerning the Reimbursement of Costs, November 12, 1959, reprinted in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 293-296.

²⁰⁵ Glennan, statement before the Subcommittee on Governmental Organization for Space Activities of the Senate Committee on Aeronautical and Space Sciences, March 24, 1959, folder: Glennan Speeches and Congressional statements, Glennan subseries, Administrators series, NHDRC, 11, 15-16.

Glennan "... reported that he is finding his working relationships with Dr. York and Secretaries Gates and Douglas extremely fine."²⁰⁶ There were no radical departures from this assessment during his remaining two years as NASA's Administrator. Only a few days before departing NASA in January 1961, Glennan summarized, "People in both NASA and the Department of Defense are ambitious and imaginative. In such a situation there will always be pulling and hauling. But there has been less controversy and more cooperation in the last year than anyone had any right to expect." Schriever concurred in 1961 when asked about the NASA-USAF relationship: "It is completely satisfactory. I think that we had some growing pains at first when NASA was first created. During the past year our relationships - at least from my level - and I think this is true at the higher levels - has been extremely good."²⁰⁷

This chapter has attempted to show how the initial stages of the NASA-DoD relationship unfolded as well as how the relationship evolved as part of the overall Eisenhower space philosophy in action. On the one hand, Eisenhower did not want a full-speed, crash program of space spectacles. On the other hand, he recognized what he termed the "psychological" component of space exploration and did authorize the Saturn program as the vehicle that would eventually enable America to launch the large payloads that tended to be viewed as spectacular firsts by the world. Eisenhower also ensured that the space for peace philosophy continued to be America's primary statement on space affairs. He had little tolerance for "space cadets" in the military who wanted to discuss lunar bases or antisatellite weapons because such statements might endanger the fragile principle of freedom of overflight for reconnaissance satellites that lay behind the space for peace philosophy. As one perceptive historian has written

The clear mandate from the Eisenhower administration . . . was that NASA's space efforts would be nonmilitary in character and highly visible to the public. This would serve two distinct but necessary purposes. First, NASA's projects were clearly cold war propaganda weapons that national leaders wanted to use to sway world opinion about the relative merits of democracy versus the communism of the Soviet Union. The rivalry was not friendly, and the stakes were potentially quite high, but at least this competition had the virtue of not being military in disposition. . . . Second, NASA's civilian effort served as an excellent

²⁰⁶ Memcon, April 8, 1960, folder: Staff Notes - April 1960 (2), box 49, DDE Diary Series, Ann Whitman file, DDEL, 2.

²⁰⁷ Glennan and Schriever quoted by Stephen I. Grossbard, *The Civilian Space Program: A Case Study in Civil-Military Relations*, Ph.D. dissertation (University of Michigan, 1968), 168.

smoke-screen for the DOD's military space activities, especially for reconnaissance missions. NASA's civilian mission, therefore, dovetailed nicely into cold war rivalries and priorities in national defense.²⁰⁸

The only remaining question concerning the Eisenhower administration is how early human spaceflight projects fit into his philosophy and into the NASA-DoD relationship.

²⁰⁸ Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 34-35.

5. Programmatic Beginnings: Mercury, Dynasoar, and the NRO Under Eisenhower

[Eisenhower] completed the framing of American astronautics in a house of three wings: civil space science and applications (NASA), Department of Defense military support systems (such as communication, navigation, and missile early warning), and reconnaissance satellites. This division of effort also would be endorsed formally by his successors and remain in effect from that day to this.¹

He had already decided not to embark on a full-scale man-in-space program beyond MERCURY.²

The President said he was ready to say that he saw no scientific or psychological reason for carrying the man-in-space program beyond the MERCURY program. He thought the idea of a man on the moon was sheer Buck Rogers fiction.³

Eisenhower's space program, however, did not include any real commitment to, or belief in, the goal of human space flight. Human space flight did not have a serious national security component, as far as he or his senior advisers could see, and therefore was probably not worthy of much federal effort.⁴

Mercury's Antecedents

Early Air Force Man-In-Space Activity

The story of human spaceflight in the Eisenhower administration, like many trends in his space policy, does not begin with Sputnik but rather has pre-Sputnik antecedents. In this case, the historian must look at the efforts the Air Force made to justify a human presence in space even before the fall of 1957. Then, in the months before NASA began operations in late 1958, the overriding question was whether Eisenhower would assign the human spaceflight mission to the new NASA or to the Air Force.

¹ R. Cargill Hall, "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security," *Prologue: Quarterly Journal of the National Archives* 27 (Spring 1995): 68.

² Remark of NASA Administrator T. Keith Glennan, Memorandum of Discussion at the 470th Meeting of the NSC, December 21, 1960, folder: 470th Meeting of the NSC, box 13, NSC series, Ann Whitman file, DDEL, 3.

³ *Ibid.*, 6.

⁴ Roger D. Launius, "Eisenhower, Sputnik, and the Creation of NASA," *Prologue: Quarterly Journal of the National Archives and Records Administration* 28 (Summer 1996): 130.

He gave it to NASA in August 1958 and Project Mercury came into existence that fall. Simultaneously, however, the Air Force continued to pursue its Project Dynasoar, also designed to place a human in orbit. Therefore, the Eisenhower administration laid the foundation for the complex NASA-DoD relationship concerning human spaceflight projects that would fully emerge in the Kennedy administration.

As early as November 1948 the Air Force's School for Aviation Medicine held a symposium on "The Medical Problems of Space Travel."⁵ In 1949 the Air Force appointed Dr. Hubertus Strughold as the first professor of Space Medicine at its School for Aviation Medicine. That same year the school organized a Department of Space Medicine. This school had numerous other symposia in the late 1940s and early 1950s exploring the requirements of human flight in the upper atmosphere and, by extension, the weightlessness of outer space. One study of the evolution of space medicine concludes, "By the mid-fifties current thinking in the Air Force was increasingly oriented toward possible manned space flight."⁶

Indeed, numerous sources attest to the fact that by early 1956, the USAF was seriously studying the requirements of human spaceflight. Most of this work emanated from the Air Research and Development Command (ARDC), and more specifically its Ballistic Missiles Division (BMD) under General Schriever. In March 1956 BMD initiated a series of studies termed "Manned Ballistic Rocket Research System" to examine the technology of human spaceflight and create preliminary designs of spacecraft capable of being recovered from orbital conditions. BMD secured the assistance of the NACA and industrial contractors in this effort.⁷ These studies continued at a relatively low level throughout 1957 but began to pick up momentum in 1958 as the government began to forge its response to Sputnik. For instance, on January 31, 1958 the Air Force's Deputy Chief of Staff for Development, Lieutenant General Donald Putt, directed ARDC to determine the quickest way to put a man into space and recover him. Putt

⁵ Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960, volume I* (Maxwell AFB, AL: Air University Press, 1989), 544.

⁶ Mae Mills Link, *Space Medicine in Project Mercury*, NASA SP-4003 (Washington, DC: USGPO, 1965), 12. Strughold had been director of aeromedical research for the German Air Force.

⁷ For more details on these early study efforts see "Outline of History of USAF Man-in-Space Program R&D Program," August 1962, K140.11-7, AFHSO.

also wrote NACA Director Hugh Dryden and formally invited NACA to participate in this effort, encompassing both a one-orbit human flight and a boost-glide research airplane (Dynasoar). In early February 1958, however, the NACA verbally informed ARDC that NACA was preparing its own manned capsule designs to be ready by late March and therefore could not cooperate with the USAF effort before that point.⁸ One NACA insider stated Dryden "had a very good ear to the ground. . . . he could see the handwriting on the wall, that probably the manned space program was going to be run by a civilian agency. . . . He didn't want to sign any papers with the Air Force at that time."⁹ In contrast to the lack of cooperation in designing a ballistic capsule to orbit the earth, DoD-NACA cooperative work on Dynasoar was formalized and will be discussed below.

Vice CSAF General Curtis LeMay did not want to delay designing a capsule-type design and he ordered ARDC on February 27, 1958 to prepare and submit an official Air Force Man-in-Space program as soon as possible. The next day ARPA Director Roy Johnson ". . . recognized the Air Force has a long term development responsibility for manned space flight capability with the primary objective of accomplishing satellite flight as soon as technology permits." Johnson authorized development of a test vehicle for experimental flights with laboratory animals with the goal of eventually orbiting a human.¹⁰ The Air Force again turned to the NACA and ". . . said that the Air Force would like NACA to participate in the examination of the man-in-space problem and to furnish guidance and experience in the logic of the program, and the feasibility from the technical point of view."¹¹ NACA seemed more willing to cooperate in March and April than it had in January 1958: on April 11 Dryden did sign an agreement to conduct a

⁸ Ibid., 1.

⁹ Oral history interview of Robert Gilruth, February 27, 1987, NASM, 242. Gilruth had been chief of the NACA's PARD, exploring the possibility of human spaceflight before NASA came to be. He would be the head Project Mercury and then became the director of NASA's Manned Spacecraft Center in Houston, TX, subsequently renamed the Johnson Space Center.

¹⁰ Air Force Systems Command, Space Systems Division, *Chronology of Early Air Force Man-in-Space Activity* (AFSC Historical Publications Series 65-21-1, 1965), NSA MUS document 446, p. 18.

¹¹ Maxime Faget, Aeronautical Research Engineer, Memorandum for NACA Associate Director, Subject: Attendance at ARDC briefing on "Man in Space" program, March 5, 1958, dated March 7, 1958, folder: USAF MIS/MISS, DoD subseries, Federal Agencies series, NHDRC, 1.

joint Man-in-Space program with the USAF.¹² This "agreement," never implemented because NACA quickly "tabled" it, said, "Management of the design, construction, and operational phases of the project shall be performed by the Air Force."¹³ During April, however, NACA did at least supply inputs into the BMD report issued on April 25 in response to LeMay's February tasking, "Air Force Manned Military Space Systems Program." This report was the first official Air Force human spaceflight plan: it consisted of four phases.

First, Man-In-Space-Soonest would determine the functional capabilities and limitations of humans in space by means of earth orbital flights. Next, Man-in-Space-Sophisticated would have a vehicle capable of 14-day orbital flights and conduct experiments essential for a lunar exploration program. Third, Lunar Reconnaissance would explore the moon with a television camera and other instrumented packages. Finally, "Manned Lunar Landing and Return" would test the equipment for circumlunar flights before climaxing with a human lunar landing, brief surface exploration, and return. The estimated date of completion for the entire program was December 1965 with an estimated total cost of \$1.5 billion.¹⁴ PSAC reported to Killian, "An NACA-Air Force cooperative effort on the manned satellite program appears to be in high gear with every reason to believe a satisfactory working agreement in this field will continue."¹⁵ This April 1958 plan was the first of seven such plans the Air Force would publish in 1958; most were scaled-back versions of this original plan designed to reduce expenses in the face of waning support for a military human spaceflight program beyond Dynasoar. For instance, by the fourth iteration

¹² Outline of History of USAF Man-in-Space R&D Program, 2.

¹³ Clotaire Wood, Assistant to the Director for Research Management, NACA, Transmittal of copies of proposed memorandum of understanding between Air Force and NACA for joint NACA-Air Force project for a recoverable manned satellite test vehicle, April 11, 1958, SPI document 117, p. 1.

¹⁴ *Chronology of Early Air Force Man-in-Space Activity*, 23. The author has requested declassification of the actual and complete April 1958 plan from AFHRA but no action had been taken as of December 1996.

¹⁵ PSAC staff member R. Piland, Memorandum to Killian, April 14, 1958, folder: National Aeronautics and Space Administration (1), box 44, Confidential file, White House Central files, DDEL, 1.

at the end of May 1958 the Air Force Man-in-Space program had already reduced planned expenditures from \$398 million to \$109 million, with no administration approval yet in sight.¹⁶

The May 1958 version of the Air Force's Man-in-Space plan has been significantly declassified and reveals the importance the USAF attached to the program as well as the problems inherent in it. First, "The precise mission of the USAF in space with either uninhabited or manned vehicles cannot as yet be conclusively stated." But expedited R&D and experimentation "... will lead directly to maximized military mission applications and to space superiority. The USAF further believes that a national capability to control space is a fundamental requirement since on it will depend the future position, prestige, and welfare of the U.S.A." The Air Force concurred that reconnaissance, communications, and early warning were the immediately available military uses of space but also stated, "... these applications are merely the rudimentary ancestors of the sophisticated Air Force space weapons systems of the 1970-1980 era and beyond" because "... man exceeds by many orders of magnitude the capabilities of present and prospective automata in perceptive acuity, level of judgment and decision making ability, and flexibility." The May 1958 plan said the USAF must gain approval for a human spaceflight program in which "... manned landing on the moon and return to earth has been chosen as the specific terminal mission." In the long run this would mean "... the weapons systems designer of the future will have to him the bonus alternative of utilizing the moon as a base of Air Force operations."¹⁷ As explained in the previous chapter, this type of rhetoric, forecasting the military control and use of space, was in no way attractive to the civilian space policy makers in the Eisenhower administration because it contravened the space for peace policy and could possibly endanger the free passage of reconnaissance satellites. Therefore, assigning the human spaceflight mission to NASA became increasingly likely during the summer of 1958.

One Air Force history of the program explains that by July 25, 1958 ARPA Director Johnson informed the USAF of five points. First, the Air Force's Man-in-Space program was not yet approved.

¹⁶ Robert F. Piper, *The Space Systems Division: Background, 1957-1962*, AFSC Historical Publications Series 62-27, SSEH-40 (Air Force Systems Command, 1963), x; and Air Force Ballistic Missile Division's Responsibility for "Man-in-Space" Program, K140.11-7, AFHSO, 2.

¹⁷ USAF/ARDC/BMD, USAF Manned Military Space Development Plan, Volume II, IRIS 1002991, AFHSO, II-1 through II-3.

Second, if it ever was, even a \$50 million budget was an optimistic assumption. Next, statements of prominent scientists to the White House "... had convinced the White House there are no currently valid reasons for Man-In-Space." Therefore, when NASA became active, the human spaceflight program was likely to become a joint ARPA/NACA effort at best. Finally, NASA "... was already thinking of an independent but very similar space program that would cost about \$40 million in fiscal 1950." Overall, "It was made clear that quick approval of a military man in space program was not forthcoming. ... the military services and particularly the Air Force found their space prospects disheartening. Obviously the military services no longer controlled development of space vehicles and programs [and] the new fiscal year offered little hope for change."¹⁸

As its expansion into a larger and more powerful NASA became increasingly likely after Eisenhower submitted his Space Act in April 1958, the NACA had little reason to forge a cooperative human spaceflight program with the military because it appeared there was a good chance the new NASA would be given the mission. This explains the quick turn of events in which during March Dryden and NACA agreed to work with the Air Force in developing its Man-in-Space program as a "joint project for a recoverable manned satellite test vehicle," in April Eisenhower submitted his Space Act which "appeared likely to transform NACA into the focal point of the nation's efforts in space," and in May NACA withdrew from the cooperative joint undertaking Dryden had signed April 11 and tabled indefinitely its participation with the Air Force in human spaceflight R&D outside of Dynasoar.¹⁹ As a memo from Dryden's office files delicately stated, once Eisenhower submitted his Space Act in April, NACA leaders discussed the Air Force's offer for a cooperative Man-in-Space project and agreed "... that the prospective Agreement should be put aside for the time being. The matter may be taken up again when the responsibilities of ARPA and NASA have been clarified."²⁰

¹⁸ *Chronology of Early Air Force Man-in-Space Activity*, 32-33.

¹⁹ Loyd S. Swenson Jr., James M. Grimwood, Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966), 81-82.

²⁰ Clotaire Wood of the NACA, Memorandum for Files, Tabling of Proposed Memorandum of Understanding between Air Force and NACA - Project for a Recoverable Manned Satellite Test Vehicle, April 11, 1958, dated May 20, 1958, SPI document 288, p. 1.

The fact is the NACA had started independent investigations into human spaceflight vehicle designs within its own laboratories and away from the USAF. As Project Mercury's official history explains, "... the research engineers at Langley and on Wallops Island were pushing their own studies. they could see the opportunity to carry out a manned satellite project coming their way." Throughout spring 1958 NACA's labs "were urgently engaged in basic studies" of propulsion, spacecraft configuration, orbit and recovery techniques, guidance and control, and the myriad other details of a human spaceflight program.²¹ NACA's work progressed to the point that wind tunnel experiments were conducted on various vehicle designs and rockets were launched with models of assorted orbital vehicles. All in all, NACA engineers "... were steadily modifying the manned ballistic satellite design itself" and by late 1958 had settled on the design that became the basis of Project Mercury.²² Therefore, while some in the Air Force would later lament that Project Mercury was simply a wholesale borrowing from the USAF Man-in-Space plans, this appears not to be the case. NACA was independently working on most aspects of spacecraft design and when Eisenhower did award NASA the human spaceflight mission in August 1958 the NACA's efforts could then incorporate Air Force designs and engineering resulting from USAF Man-in-Space plans. Therefore, while the USAF could not claim Project Mercury was simply a redesignated Air Force Man-in-Space design, neither were later NASA assessments correct in stating, "Project Mercury had grown out of the pioneering work on manned space flight at Langley Research Center," thereby ignoring the Air Force contributions to Mercury's designs.²³

By early June 1958 NACA representatives were reminding ARPA representatives at meetings "... that the direct responsibility for the man-in-space program may quite likely be given to the soon to be created civilian space agency" and so the DoD's program should be formulated so as to be acceptable to

²¹ Ibid., 93-94. Langley Aeronautical Laboratory was the NACA's first and flagship research facility. Its PARD or Pilotless Aircraft Research Division tested missile and space equipment and was based at Wallops Island.

²² Ibid., 94.

²³ NASA Historian Eugene M. Emme, "Historical Origins of NASA," *Airpower Historian* 10 (January 1963): 20.

NASA and to facilitate management transfer with little difficulty.²⁴ Even as the Eisenhower administration was poised in July and August to formally assign the human spaceflight mission to NASA or the DoD, its opinion of the prestige-related importance of the program seemed low. A panel with representatives from all relevant agencies (PSAC, ARPA, NACA, BoB, NSC) concluded on July 2, 1958 that the human spaceflight program "... in general was looked upon rather unfavorably. The amount of psychological effect was questioned and no scientific applications were advanced. It was generally agreed that man-in-space (orbit) should not be put on a crash basis. . . . The man-in-space program should be handled on a long-term basis."²⁵ This would remain the Eisenhower administration position for the remainder of its duration.

Eisenhower Awards NASA the Mission

In late July 1958 both ARPA/USAF and PSAC/NACA drew up papers supporting their respective cases for being the organization given the human spaceflight mission. ARPA said the DoD had an immediate requirement to undertake an immediate R&D program in this field because "Such a program will lead to a significantly improved capability to accomplish existing military missions, such as reconnaissance, navigation and communications. In addition, development of such a capability is inherently a component of necessary military programs of a future, entirely predictable character." A human being would be a "superior mechanism" in most space systems because unmanned satellites would have a limited lifespan and could not be repaired. Therefore, "It is quite likely that a single high sophistication and manned and recoverable vehicle system will be both more efficient and more economical." Practically speaking, ARPA said the DoD already had the installations, facilities, and rockets required for the human spaceflight mission and "the duplication of such facilities is unacceptable. Dual utilization is undesirable

²⁴ Maxime Faget, letter to Hugh Dryden, June 5, 1958, SPI document 1490, p. 1.

²⁵ R.O. Piland, Memorandum to Killian, Subject: Notes on the Space Panel Meeting, July 2, 1958, dated July 8, 1958, SPI document 1127, p. 5-6.

and substantially impractical when programs having the ultimate magnitude of a man-in-space effort are considered."²⁶

The NACA/PSAC presentation emphasized, "The NASA through the older NACA has the technical background, competence, and continuing within-government technical back-up to assume this responsibility with the cooperation and participation of the Department of Defense." These two groups also believed the exception clause of the Space Act supported NASA's claim to the human spaceflight mission: "The assignment of the direction of the manned satellite program would be consistent with the President's message to Congress and with the pertinent extracts from the National Aeronautics and Space Act of 1958."²⁷ PSAC summarized to its chairman Killian, "At the present time there is no seriously proposed weapon system, or military operation, which requires the development of a manned satellite. In addition, no reasons have been advanced which indicate that this research and development activity is 'necessary to make effective provision for the defense of the defense of the U.S.' other than the 'feeling' that the military ultimately will require manned satellites or other space vehicles." The scientists felt human spaceflight was essentially research, not operations, and so should be in NASA. In addition, if the mission was given to DoD, this "... cannot help but set a precedent for future, more extensive manned projects."²⁸

ARPA seems to have sensed that NACA and Killian's office had the stronger case for presentation to Eisenhower. The ARDC commander informed the CSAF and Vice CSAF that ARPA Director Johnson explained to him "... that the current prevalent view in the White House is that there is no requirement for 'Man in Space.'"²⁹ As the preeminent history of this period states, "But by August the Air

²⁶ John E. Clark, Rear Admiral, Deputy Director, ARPA, Memorandum for Killian, Subject: Man-in- Space, July 23, 1958, folder: Space Notebook, Piland, 1958-59 (4), box 16, OSAST, White House Office, DDEL, 1-3.

²⁷ Hugh Dryden, letter to Killian, Manned Satellite Program, July 18, 1958, folder: Space Notebook, Piland, 1958-59 (4), box 16, OSAST, White House Office, DDEL, 1-2.

²⁸ R.O. Piland, PSAC Secretary, Memorandum for Killian, Subject: Responsibility for "Activities Directed Toward the Development of a Manned Satellite," folder: Space Notebook, Piland, 1958-59 (4), box 16, OSAST, White House Office, DDEL, 1-2. Emphasis in original.

²⁹ George S. Brown, Colonel, USAF, Executive to the CSAF, Memorandum for Record, July 25, 1958, folder: Man in Space, DoD subseries, Federal Agencies series, NHDRC, 1.

Force's hopes for putting a man into orbit sooner than the Soviet Union, or than any other agency in this country, were fading rapidly before the growing consensus that manned space flight should be the province of the civilian administration."³⁰ Most scholars conclude it was August 20, 1958 that Eisenhower decided to award the human spaceflight mission to NASA and not the DoD, and that his decision was closely tied to his space for peace policy and the fact that there was no clear military justification to put humans in orbit. In addition, the human spaceflight budget would be \$40 million, to include \$30 million from NASA and \$10 million transferred from ARPA.³¹ With the exception of the Dynasoar vehicle, the DoD's role after August 1958 in the human spaceflight arena has been encapsulated by one USAF history: "Subsequent Air Force activity has consisted of supporting the NASA MERCURY program with ATLAS boosters, wind tunnel tests, launch facilities and range facilities, capsule drop tests and recovery support and a comprehensive life science program."³² As NACA's official history explains, Eisenhower "... did not want to hand over to any group in the Pentagon a large and potentially enormous new area of activity, especially when he seriously doubted the services' ability to handle their current missions."³³

One of the first actions NASA took when it started operations on October 1, 1958 was to officially approve Project Mercury as its program for human spaceflight.³⁴ By March 1959 Glennan would testify to Congress, "Finally, despite reports to the contrary, there is only one U.S. manned-satellite program: NASA's Project Mercury. . . . And representatives of each of the services are regular working

³⁰ Swenson et. al., 101.

³¹ Ibid., 101-102. Other sources concurring in the August 20, 1958 date, and discussing budgetary figures, include Outline of History of USAF Man-in-Space R&D Program, 3; and Eugene M. Emme, Chronology of Man-In-Space R&D Program, August 1962, folder: USAF Man-in-Space Chronology, DoD subseries, Federal Agencies series, NHDRC, 6.

³² Outline of History of USAF Man-in-Space R&D Program, 4-5.

³³ Alex Roland, *Model Research: The National Advisory Committee for Aeronautics, 1915-1958, Volume I*, NASA SP-4103 (Washington, DC: USGPO, 1985), 298-99.

³⁴ R. Cargill Hall, "Instrumented Exploration and Utilization of Space: The American Experience," in Eugene M. Emme, editor, *Two Hundred Years of Flight in America*, American Astronautical Society History Series, volume 1 (San Diego, CA: Univelt, Inc., 1977), 189.

members of the Project Mercury team."³⁵ Glennan was making a fine distinction between Dynasoar and a manned satellite program. Dynasoar was a sort of powered glider designed for orbital operations but presented by the Air Force as intended for suborbital R&D into hypersonic flight (equal to or exceeding five times the speed of sound.) Through this semantic massaging the Dynasoar was not technically a space vehicle because it would not complete an entire orbit. Realistically however, as will be seen below, the Air Force fully expected the Dynasoar to engage in orbital operations once it was perfected. In the Eisenhower administration it was politically advisable to present it as a suborbital vehicle so it would not become mixed up in the complicated OSD/ ARPA/USAF/ NASA/PSAC organizational give and take.

Eisenhower, Prestige, and Human Spaceflight

Before plunging into the programmatic details of Dynasoar and Mercury, however, it is necessary to examine the last relevant component of Eisenhower's space policy: what were his views on using human spaceflight as a competitive tool for winning prestige in the cold war struggle with the USSR after NASA's establishment? Evidence presented thus far indicates he was not keen on the notion before October 1958. Nor would he endorse the idea of a human spaceflight race after NASA began operations. This is not to say the Eisenhower administration was unaware of Soviet plans for human spaceflight. The CIA reported in August 1958: "We believe that the ultimate foreseeable objective of the Soviet space program is the attainment of manned space travel on an interplanetary scale. . . . While the Soviet space program was undoubtedly initiated to serve scientific purposes, an immediate aim was to achieve political and propaganda gain."³⁶ However, Eisenhower concluded he would not take the Soviet competitive bait in the case of human spaceflight. While he did approve Project Mercury he did not let its budget skyrocket, and he was ready to end NASA's human spaceflight program at the conclusion of his administration because

³⁵ T. Keith Glennan, Statement before the Subcommittee on Governmental Organization for Space Activities of the Senate Committee on Aeronautical and Space Sciences, folder: Glennan Speeches and Congressional Statements, Glennan subseries, Administrators series, NHDRC, 14.

³⁶ CIA, NIE 11-5-58, Soviet Capabilities in Guided Missiles and Space Vehicles, August 19, 1958, folder 13, box 1, RG 263, Records of the Central Intelligence Agency, NARA, 26.

it represented everything he wanted to avoid in space policy: it was hugely expensive, was "driven almost entirely by the competition with Russia, and lacking in a compelling scientific rationale."³⁷

In an NSC meeting in May 1959 Eisenhower reminded his staff, "If a program is being conducted for psychological reasons only, we must look at it with a jaundiced eye."³⁸ Eisenhower tried to maintain a delicate balance between a crash human spaceflight program and completely ignoring such a program. He said later that year concerning human spaceflight he "... wants some achievements that will encourage and hearten our people. At the same time we should seek to discover scientific principles that will be of use to our military forces."³⁹ Killian delivered a speech in September 1960 which, even though he had returned to MIT, still represented the advice Eisenhower received from his trusted scientists on the wisdom of a spectacular race for prestige using human spaceflight. In it Killian stated he believed "... that our man-in-space program is on the way to becoming excessively extravagant and will be justified only as a competitor for world prestige with the Soviet man-in-space program. Many thoughtful citizens are convinced that the really exciting discoveries in space can be realized better by instruments than by man. . . . Unless decisions result in containing our development of man-in-space systems and big rocket boosters, we will soon have committed ourselves to a multibillion dollar space program."⁴⁰ Killian's successor, George B. Kistiakowsky, remarked with great displeasure that Project Mercury "... would be only the most expensive funeral man has ever had."⁴¹ Kistiakowsky characterized the human

³⁷ Fred Greenstein and David Callahan, chapter 1, "The Reluctant Racer: Dwight D. Eisenhower and United States Space Policy," in the forthcoming Roger D. Launius, editor, *The Myth of Presidential Leadership* (Urbana, IL: University of Illinois Press), 74 in manuscript copy.

³⁸ NSC, Memorandum of Discussion at the 406th Meeting of the NSC, May 13, 1959, folder: 406th Meeting of the NSC, box 11, NSC series, Ann Whitman file, DDEL, 8.

³⁹ Memcon, September 21, 1959, dated September 23, 1959, folder: Staff Notes - September 1959 (1), box 44, DDE Diary series, Ann Whitman file, DDEL, 4.

⁴⁰ Killian speech to the Dallas Council on World Affairs, September 23, 1960, folder: Ad Hoc Man-in-Space Panel, box 65, Subject Files, 1957-62, RG 359, Office of Science and Technology, NARA, 4.

⁴¹ Cited in James R. Hansen, *Spaceflight Revolution: NASA Langley Research Center from Sputnik to Apollo*, NASA SP-4308 (Washington, DC: USGPO, 1995), 51.

spaceflight effort in general as a “. . . scientific luxury that should not be allowed to divert national efforts from more urgent scientific challenges here on earth.”⁴²

It was in the final months of the Eisenhower administration that his conclusions, and those of his subordinates, concerning the inadvisability of pursuing human spaceflight for prestige-related reasons become most clear. At a conference with the president in October 1960 Glennan discussed the idea of sending humans to the moon. NASA had been exploring this possibility under its Project Apollo study program. Glennan said his conclusion was that this was a multi-billion dollar project “of no immediate value” and that he was “. . . screwing up his courage to state publicly that this should not be done.” Eisenhower then agreed that such a project was “. . . useless at this moment and would not think it really worth the money.” Glennan interjected that while Mercury was “moving ahead under a full head of steam . . . if we fail to place a man on the moon before 20 years from now, there is nothing lost.” Eisenhower said “. . . he likes to see us go ahead on useful things but he is not much of a man on spectaculars.” He added he had “little interest in the manned aspects of space research,” having realized “that some stunts, such as the Lindbergh trip across the Atlantic, have some virtue” but Eisenhower “emphasized that he would not be willing to spend tax money to send a man around the moon.” Eisenhower concluded by concurring with Glennan’s suggestion that the whole issue should be left for the next president and “emphasized his desire to avoid crash programs. He said there is such a thing as common sense, even in research.” Finally, Eisenhower tasked his science adviser Kistiakowsky and Glennan to form a panel to reach a position on the amount of effort that was appropriate for the human spaceflight program after Mercury.⁴³

One weakness in fully understanding Eisenhower’s conception of not using human spaceflight as a competitive tool in the cold war race for prestige is why did he then authorize the Saturn rocket as the

⁴² Cited in Jay Holmes, *America on the Moon: The Enterprise of the Sixties* (New York: J.B. Lippincott Co., 1962), 193.

⁴³ T. Keith Glennan, in J.D. Hunley, Editor, with an Introduction by Roger D. Launius, *The Birth of NASA: The Diary of T. Keith Glennan*, NASA SP-4105 (Washington, DC: USGPO, 1993), 245; and John S.D. Eisenhower, Memcon, October 13, 1960, folder: National Aeronautics and Space Administration (8), box 18, Alphabetical subseries, Subject series, Office of the Staff Secretary, DDEL, 1-3.

next generation space booster, with the ability to lift much higher payloads than the ICBM-based boosters? Glennan stated clearly in October 1960 that the Saturn program would cost at least \$7 billion over ten years and that "There is really not much use doing this unless we are aiming at placing a man on the moon," an effort which overall would cost between \$14 and \$35 billion.⁴⁴ While Eisenhower did authorize the Saturn and increased its funding, there is no record of exactly which prestige-related payloads he did believe it should launch. The record is, however, clear on the fact that extensive human spaceflight missions were not the type of missions he envisioned for the superbooster. Eisenhower expressed this puzzling notion with national security adviser Gordon Gray in November 1960: "The President felt that the only place we ought to be even in a clandestine way contesting with the Soviet Union is the development of the big engine. He repeated his often expressed view that little would be accomplished by putting a man into space."⁴⁵

The report Eisenhower tasked Glennan and Kistiakowsky with preparing concerning the appropriate level for the human spaceflight program was in fact prepared by a panel chaired by Donald Hornig, a PSAC member and chemistry professor at Princeton University.⁴⁶ The Report of the Ad Hoc Panel on Man-in-Space, delivered December 16, 1960 declared, "We have been plunged into a race for the conquest of outer space. . . . the most impelling reason for our effort has been the international political situation which demands that we demonstrate our technological capabilities if we are to maintain our position of leadership." The report explained Mercury was by definition a "somewhat marginal effort, limited by the thrust of the Atlas booster," which, as a converted Air Force ICBM, had barely sufficient power for human spaceflight payloads. Nevertheless, Hornig's panel concluded Project Mercury had to be pushed due to "political desire either to be the first nation to send a man into orbit, or at least to be a close second. This marginal capability cannot be changed substantially until the Saturn booster becomes available."⁴⁷

⁴⁴ Glennan, *Birth of NASA*, 255.

⁴⁵ Gordon Gray, Memorandum of Meeting with the President, November 8, 1960, folder: 1960 - Meetings with the President - Vol. 2 (4), box 5, Presidential subseries, Special Assistants series, OSANSA, DDEL, 3.

⁴⁶ Hornig would later become Lyndon Johnson's science adviser and then president of Brown University.

In fact, the report stated that even the Saturn rocket would probably not be enough to land humans on the moon and safely return them: a new Nova rocket, possibly featuring both chemical and nuclear propulsion, would be required.⁴⁸

The Ad Hoc Panel's conclusion was sure to shock the fiscally prudent president. It would cost a minimum of \$350 million to orbit a human; \$8 billion to circumnavigate the moon; and \$26-35 billion to land on the moon and return, perhaps around 1975. Saturn should be regarded as only an intermediate step because it "... must be followed by a much bigger development before manned lunar landing is possible."⁴⁹ Glennan's initial reaction to such talk was that when the discussion turns to the prestige of the United States resting on the question of who lands a human on the moon first, then "... it seems clear that all sense of perspective has gone out the window. Clearly, with the probability that at least ten years must elapse before we can accomplish the feat of putting a man on the moon, the leadership and stature of the United States will no longer be in question. Either we will be the leader or we will not."⁵⁰

Eisenhower's reaction was even more caustic when the Hornig panel's report was briefed to him at an NSC meeting on space on December 20, 1960. Glennan introduced the presentation by explaining somewhere between 1964 and 1966 "the United States would have to decide (1) whether to spend large sums of money to put a man on the moon, and (2) if a landing were to be attempted, what vehicle should

⁴⁷ PSAC, Executive Office of the President, Report of the Ad Hoc Panel on Man-in-Space, December 16, 1960, in John M. Logsdon with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 408-09.

⁴⁸ *Ibid.*, 3. As mentioned in the preceding chapter, many of the performance and design characteristics posited for this Nova rocket were in fact included in what came to be known as the Saturn V booster which eventually took Americans to the moon and back. The intricate relationships between various types of vehicles within the Saturn family is best presented in Roger Bilstein, *Stages to Saturn: A Technological History of the Apollo-Saturn Launch Vehicles*, NASA SP-4206 (Washington, DC: USGPO, 1980).

⁴⁹ *Ibid.*, 7.

⁵⁰ Glennan, *Birth of NASA*, 269.

be developed for this purpose?"⁵¹ Glennan outlined NASA's long-term budget picture and even before the Hornig panel briefing, Eisenhower replied that "he had a thousand questions" because, "In the space field there appeared to be no practical test of the immediate usefulness of a program. . . . He was anxious to do whatever was necessary for security, but wished to avoid the development of a SPUTNIK complex. . . . He was not prepared to say that he would support a program of \$2.4 billion for space activities in 1970."⁵² Glennan pointed out, "He had already decided not to embark on a full-scale man-in-space program beyond MERCURY." Eisenhower seemed to agree because he said he had always thought \$1 billion per year should be the ceiling on the space program budget and yet that ceiling would apparently be breached in 1962: "The President said he was reluctant to spend sums of this magnitude on space activities. He had no hesitation in supporting vast programs designed to acquire specific scientific information, or programs which were necessary for psychological reasons," but he believed the budget amounts in Glennan's long-range projections for \$1.9 billion were excessive.⁵³

At this point Eisenhower received the actual Ad Hoc Panel's briefing on the man-in-space program. To which, "The President said that, like Isabella, we were hocking our jewels for this purpose." The all-inclusive figure for a lunar effort was now presented as \$33-\$46 billion. Kistiakowsky, who gave the briefing, recalls Eisenhower "just about blew a gasket. He was horrified."⁵⁴ The NSC minutes record his lamenting that ". . . the SPUTNIK complex impelled us to do everything yesterday. . . . He had to think about the country as a whole, the economy, and the other demands on the budget. He believed it might be necessary to establish an annual budgetary ceiling for space activities." Kistiakowsky pointed out that ". . . to a large extent the objectives of the space program must be charged to the cold war. The

⁵¹ NSC, Memorandum of Discussion at the 470th Meeting of the NSC, December 20, 1960, dated December 21, 1960, folder: 470th Meeting of the NSC, box: 13, NSC series, Ann Whitman file, DDEL, 2-3. In fact, Kennedy would decide to spend such large amounts of money in five months, not five years.

⁵² *Ibid.*, 3. In fact, NASA's space budget in 1965 would be \$5.2 billion, or more than twice the amount Eisenhower said he would not support five years after that.

⁵³ *Ibid.*, 4.

⁵⁴ Oral history interview of George B. Kistiakowsky, May 22, 1974, folder: Kistiakowsky, box: Emme/Roland interviews on early NASA history, shelf V-A-1, NHDRC, 37.

Soviets had succeeded by propaganda in instilling the idea that achievements in space were an accurate over-all measure of a country's scientific and technological potential." To which Eisenhower replied, "... he could use \$1 billion to better advantage on some other aspect of the cold war."⁵⁵ Clearly space in a general sense was not Eisenhower's preferred tool for cold war competition.

Much less did the idea of human spaceflight appeal to him as an appropriate instrument for prestige gathering. The December 20th meeting's minutes explain, "The President said he was ready to say that he saw no scientific or psychological reason for carrying the man-in-space program beyond the MERCURY program. He thought the idea of a man on the moon was sheer Buck Rogers fiction. . . . The President said we were facing a difficult fiscal problem because our rate of expenditure was increasing faster than our economic growth."⁵⁶ Glennan's diary entry concerning this December 20, 1960 meeting records Eisenhower's response to such huge sums for a lunar landing: "He couldn't care less whether a man ever reached the moon."⁵⁷ The conclusion of the NSC as a whole was therefore that "... further testing and experimentation will be necessary to establish whether there are any valid scientific reasons for extending manned space flight beyond the MERCURY program."⁵⁸

Clearly, then, at the end of his tenure, Eisenhower was convinced that human spaceflight should, at best, continue after Mercury contingent upon obtaining further scientific justification, but not for prestige-related reasons. At worst, human spaceflight might very well end completely after Mercury's conclusion, if no persuasive scientific reason for its continuation could be found. Human spaceflight was not an arrow in Eisenhower's cold war quiver. As Logsdon has written, the situation in early 1961 for human spaceflight was "extremely gloomy."⁵⁹ One final piece of evidence supports this conclusion: Eisenhower's final budget message of January 16, 1961. In it he said that while Mercury components contin-

⁵⁵ Memorandum of Discussion at the 470th Meeting of the NSC, 4-5.

⁵⁶ Ibid., 5-6.

⁵⁷ Glennan, *Birth of NASA*, 292.

⁵⁸ Memorandum of Discussion at the 470th Meeting of the NSC, 6.

⁵⁹ John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass. and London, England: The MIT Press, 1970), 37.

ued to be tested and hope existed for an human orbital flight in 1961, "Further testing and experimentation will be necessary to establish whether there are any valid scientific reasons for extending manned space flight beyond the Mercury program."⁶⁰ Again, Eisenhower felt human spaceflight needed additional scientific reasons for its continued existence: prestige was not a legitimate justification in his mind. In fact, even this budget message allowing for potential scientific justification was a tempered version of what Eisenhower had wanted to state, which was that human spaceflight would end after Mercury's completion. NASA Associate Administrator Robert Seamans explained, "Eisenhower wanted to put in that there should be no commitment of any sort to any follow-on manned flight effort beyond Mercury. . . . It was a very, very negative statement."⁶¹ After Kennedy's decision to send Americans to the moon before the end of the 1960s, Eisenhower told a group of naval officers, "I think to make the so-called race to the moon a major element in our struggle to show that we are superior to the Russians, is getting our eyes off the right target. I really believe that we don't have that many enemies on the moon."⁶²

The historian must understand this general lack of enthusiasm pervading the Eisenhower administration concerning human spaceflight before delving into the specifics of the two relevant systems, Projects Mercury and Dynasoar. Without the context, it would be difficult to understand the deliberate and purposeful pace at which they both proceeded during the Eisenhower years. Understanding Eisenhower's beliefs concerning fiscal solvency and his antipathy toward competing for prestige via human spaceflight makes their relatively low level of effort, when compared to the Kennedy years, more comprehensible.

⁶⁰ Eisenhower, Annual Budget Message, January 16, 1961, *Public Papers of the President, 1960-61* (Washington, DC: USGPO, 1961), 972.

⁶¹ Oral history interview of Robert C. Seamans, Jr., May 8, 1968, folder: Exit Interview, Seamans subseries, Deputy Administrator series, NHDRC, 14. Seamans became Deputy Administrator in 1965.

⁶² Eisenhower, reprinted text of his speech to the Naval War College, October 3, 1961, in "Eisenhower at the Naval War College," *Naval Institute Proceedings* (June 1971): 22.

Dynamic Soaring

The best way to picture the Dynasoar is to imagine an isosceles triangle, the entire surface of which would act as a delta-shaped wing. On top and bisecting the triangle would be a cylindrical fuselage for the pilot in front and a payload bay in back. At the base of the two equal sides, to either side of the fuselage, would be smaller triangles attached perpendicularly to the main wing structure; these would provide additional aerodynamic surfaces for control and stability. The spacecraft would be launched vertically by means of a modified ICBM and separate from it upon reaching orbital velocity. After conducting its mission on basically an orbital glide path around the earth (reconnaissance was most often mentioned although some sources speculated about delivering bombs from the Dynasoar) at perhaps 13,000 mph or more, the Dynasoar would reenter the earth's atmosphere by means of retro-rockets that would brake its velocity. Further, its assorted aerodynamic control surfaces permitted maneuverability upon atmospheric reentry and thus a selection of bases at which to land, within certain range limitations. Thus, the Dynasoar's concept of operations was often referred to as a "boost-glide" vehicle. The Dynasoar was radically different from NASA's Projects Mercury, Gemini, and Apollo, all of which shared the same and familiar basic design of a wide cone with a slightly rounded base and cylinder (for the reentry parachutes) attached to the top. These ballistic capsules had only the most limited maneuverability when compared to that which Dynasoar's aerodynamic wings provided. While the Boeing Corporation did manufacture Dynasoar prototypes, the Dynasoar was never actually launched because it was canceled in December 1963. Mercury, Gemini, and Apollo capsules, however, were launched with great fanfare and publicity throughout the 1960s and early 1970s.

A comprehensive early history of hypersonic flight and the Dynasoar is not directly relevant to this dissertation and is expertly covered elsewhere.⁶³ The most important early R&D such as conceptual studies and preliminary testing of boost-glide vehicles was done in Germany before and during WWII in a quest to develop a bomber capable of reaching the United States. After the war key individuals such as

⁶³ See Roy F. Houchin II, Major, USAF, *The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1945-1963* (Ph.D. dissertation, Auburn University, 1994). This dissertation is currently being revised for eventual publication.

General Walter Dornberger, formerly in charge of the Nazi's V-weapons program, emigrated to America. Dornberger worked for the Bell Aircraft Corporation and ceaselessly campaigned for support for a hypersonic aircraft such as that which would eventually become Dynasoar. One source calculates he made 678 presentations before various groups prior to May 1958 to get a Dynasoar-type aircraft off the drawing boards.⁶⁴ However, "Through lack of funds and high-level interest, this project was not even begun until 1956-57."⁶⁵ This is not to say activity was absent before Sputnik. The Air Force, its contractors, and the NACA conducted numerous feasibility studies on various hypersonic vehicles and their designs.

For instance, in February 1956 an ARDC document mentioned a Bomber-Missile or Bomi "... which has been extensively studied since 1951 by the Bell Aircraft Corporation [and] underwent formal evaluation last fall by the NACA. . . . It was concluded that this concept represents a potential major breakthrough."⁶⁶ An NACA meeting in February 1957 discussed what the next phase of DoD-NACA flight research should be after the X-15 explored the upper reaches of the atmosphere. Dryden discussed a "boost-glide" vehicle similar to the Dynasoar which would be boosted by a rocket and glide back down through the atmosphere. He said feasibility studies from the NACA, the USAF and the Air Force's contractors "... have indicated that with early, intensified research and study it would be possible to construct a manned airplane employing this principle . . . that would fly at tremendous speeds and have a range otherwise unobtainable in manned flight." He further reported, "Members of the NACA staff and of the staff of the Air Force have discussed this matter on several occasions and are of the opinion that it is timely from a technical point of view to start a project of this type now." At the end of this meeting, "It was agreed that the NACA staff should cooperate with the Air Force in connection with a new research airplane to follow the X-15."⁶⁷

⁶⁴ Frank Gibney, "The Missile Mess," *Harper's Magazine* (January 1960): 39; and Congress, House, Select Committee on Astronautics and Space Exploration, *The National Space Program*, House Report No. 1758, 85th Congress, 2nd Session, May 21, 1958, p. 7.

⁶⁵ *The National Space Program*, 7.

⁶⁶ Major George Colchagoff, ARDC, Memorandum to LtCol R.C. Anderson, New Research Systems, February 16, 1956, SPI document 350, p. 2.

⁶⁷ NACA, Minutes of Meeting, February 21, 1957, folder: Dyna-Soar, DoD subseries, Federal Agencies series, NHDRC, 8.

It is from this type of early, pre-Sputnik documents that one discovers mention of several Dynasoar predecessors. Dornberger and Bell Aircraft presented Bomi to the Air Force as early as April 1952 but the period thereafter was filled with uncertainty, studies, reviews, and discussions with "little or no unanimity of opinion."⁶⁸ The USAF's Wright Air Development Center completed a contract with Bell Aircraft on April 1, 1954 calling for a study of an advanced bomber-reconnaissance system. By May 12, 1955 the Air Force issued a general operational requirement for a hypersonic bombardment system.⁶⁹ Other pre-Dynasoar boost-glide vehicle concepts discussed in various settings were a Rocket-Bomber or Robo (really a redesignation of the Bomi idea), a reconnaissance vehicle called Brass Bell and a NACA-AF hypersonic R&D vehicle known as Hywards (Hypersonic Weapon and R&D System). By April 30, 1957 the USAF had consolidated the multitude of study efforts under the single name of Dynasoar.⁷⁰ The unified Dynasoar program immediately before Sputnik consisted of three stages: an experimental glider; a reconnaissance vehicle; and a bombardment vehicle.⁷¹ Air Force expenditures on Dynasoar during the 1954 through mid-1957 study phase have been estimated at \$3 million, with USAF contractors spending another \$3.8 million.⁷²

The most important point concerning a rocket-bomber or a bomber-missile during the formative period of the space for peace policy was that the civilian "DOD and [Eisenhower] administration officials did not believe a satellite should be employed as an offensive atomic weapon system or orbital bomb. Based on this policy, the closer BOMI's speed approached orbital velocity, ironically, the closer it would approach a mission the Eisenhower administration would be less likely to support."⁷³ This would cause

⁶⁸ AFSC, *Commander's Congressional Policy Book*, volume II, Tab C-1, Dynasoar Program (X-20), 168.7171-52, AFHRA, 3. Declassified at author's request.

⁶⁹ Futrell, *Ideas, Concepts, Doctrine*, volume I, 543-44.

⁷⁰ Lee Bowen, *Threshold of Space: The Air Force in the National Space Program, 1945-1959* (USAF HDLO, 1960), NSA MUS document 314, p. 34.

⁷¹ Futrell, 544.

⁷² Office of the DDR&E, report, To Define a DOD Position on DYNA SOAR, February 20, 1962, folder: Reading File, January - May 1962, box 114, RG 200, Robert S. McNamara papers, NARA. 1. Declassified at author's request.

long-term viability problems for Dynasoar if Dynasoar continued to be cast in a weapons carrying role, thereby demonstrating the USAF's "... proclivity for a manned strategic bomber to fulfill the fundamental mission inherent to achieving its independence from the Army in 1947 - strategic nuclear bombardment. . . ." ⁷⁴ If the Air Force insisted on assigning an offensive mission to Dynasoar as a space vehicle, "A day of atonement could be coming." ⁷⁵ Nevertheless, in the swirl of post-Sputnik panic and response, the Air Force issued System Development Directive 464 in November 1957 which for many marked the official start of the Air Force's Dynasoar program. ⁷⁶ This meant the Air Force could start the preliminary process of requesting actual spacecraft designs from potential contractors and move in the direction of selecting a prime contractor to build the vehicle. The NACA's and later NASA's role throughout the Dynasoar program was largely limited to research advice and laboratory and wind tunnel assistance (see below and chapter 8 for more detail). In June 1958 the Air Force selected Boeing and a consortium headed by the Martin Corporation and Bell Aircraft for a design competition. In November 1959 the USAF selected Boeing as the primary system contractor while Martin would develop the rocket to launch Dynasoar. ⁷⁷ Estimated Air Force spending on Dynasoar during the 1958-1959 study and design competition phase was \$18 million. ⁷⁸

It is important to understand that the Air Force after Sputnik saw the Dynasoar as a space vehicle and the USAF viewed the Dynasoar as a system to conduct both offensive missions such as bombardment and defensive missions such as reconnaissance. A briefing to the nation's highest ranking generals by the

⁷³ Houchin, *Rise and Fall of Dyna-Soar*, 67.

⁷⁴ Roy Houchin, "Why the X-20 Program was Proposed," *Quest: The History of Spaceflight Magazine* 3 (Winter 1994): 4.

⁷⁵ Houchin, *Rise and Fall of Dyna-Soar*, 100.

⁷⁶ Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-1984* (Ithaca, NY: Cornell University Press, 1985), 129.

⁷⁷ Air Force, Office of the Secretary of the Air Force, *Air Force Information Fact Sheet, X-20 Dyna-Soar*, January 1963, folder: X-20 Dyna-Soar Documentation, DoD subseries, Federal Agencies series, NHDRC, 6.

⁷⁸ DDR&E, report, To Define a DOD Position on DYNA SOAR, *supra*, 1.

Air Force in November 1957 explained Dynasoar “. . . will represent a major technological breakthrough in performance and mission capability for manned bombardment and reconnaissance. As weapons systems, they will represent the first step in manned space flight.” The generals were told that Dynasoar could go into orbit and “circumnavigate the globe many times for space research.” The USAF anticipated a conceptual test vehicle in Step I of the Dynasoar program by 1963: a reconnaissance system with a range of at least 5,500 miles in Step II by 1966; and a global range bombardment system in Step III by 1971.⁷⁹ The Air Force justified Dynasoar to PSAC as follows: “DYNASOAR will represent the first of a whole new generation of manned weapon systems that will succeed present day turbo-jet powered weapon systems and may eventually supplement unmanned ballistic weapon systems.”⁸⁰ Others within the executive branch were aware of the Dynasoar’s proposed missions. PSAC staffer Robert Piland wrote Killian in February 1958 explaining the Dynasoar concept and stated, “The contemplated Air Force uses are reconnaissance and strategic bombardment.” Piland also portended the difficulty Dynasoar would have in reaching operational status when he speculated its costs could easily reach a billion dollars, that there would be “tremendous development problems,” and that “It probably would have all the disadvantages of the present family of ballistic missiles such as vulnerability, long readiness time and generally complex operational procedures.” Piland explained that manned or unmanned satellites could be designed to offer the Dynasoar’s advantageous properties of recallability, maneuverability, and accuracy and would “give a much more desirable deterrent setup.”⁸¹ Therefore, the criticism that the Air Force did not have specific and well-defined missions in mind for Dynasoar is not correct. It quite clearly wanted to use the vehicle for space reconnaissance and space bombardment. The latter of these missions goes a long way toward

⁷⁹ Air Force, Briefing to the Armed Forces Policy Council, November 5, 1957, K140.11-3, AFHSO, 6.

⁸⁰ Attachment 1, Air Force policy statement on Dynasoar, attached to Robert O. Piland, Memorandum to Killian, Subject: DYNA-SOAR, November 3, 1958, folder: Missiles April-December 1958 (3), box 12, OSAST, DDEL, 1.

⁸¹ R.O. Piland, Memorandum for Killian, USAF Dinosaur [sic] Project, February 28, 1958, folder: Missiles (2), box 12, OSAST, White House Office, DDEL, 1-2.

explaining why it would encounter so much resistance during the Kennedy administration as it neared operational status.

The NACA/NASA Role in Dynasoar

The Air Force was quick to enlist the NACA's assistance in the Dynasoar program after its official go-ahead in November 1957. Its Deputy Chief of Staff for Development Lieutenant General Donald Putt wrote NACA Director Hugh Dryden in January 1958. "The Air Force is convinced that we must undertake at once a research vehicle program having as its objective the earliest possible manned orbital flight" and so has undertaken a design competition for a "hypersonic boost glide vehicle nicknamed Dynasoar I." Putt told Dryden that the concept conforms closely to previous NACA recommendations and would be able to orbit as a satellite. Since both the Air Force and the NACA were "well along in investigations seeking the best approach to the design of a manned earth orbiting research vehicle," Putt invited the NACA "to collaborate with the Air Research and Development Command in this important task."⁸² In a separate letter, Putt elaborated to the ARDC commander on his proposal to Dryden: "The Air Force-NACA team relationship which has proven so productive in earlier programs of the X-airplane series will be continued in the conception of this new program." Putt explained that a human spaceflight program, through either a glide vehicle like Dynasoar or through a minimum altitude satellite such as that being proposed by Schriever's BMD "... is a significant technical milestone in the USAF space program. It is also vital to the prestige of the nation that such a feat be accomplished at the earliest technically practicable date - if at all possible before the Russians."⁸³

However, an internal NACA memorandum in early February revealed that NACA had concluded, "ARDC did not consider us equal partners in the development of this vehicle in the sense that we are in the X-15 project. This was as suspected but had not known" until recent meetings. For instance,

⁸² Donald Putt, letter to Hugh Dryden, January 31, 1958, reprinted in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 281.

⁸³ Putt, Memorandum to Commander, Air Research and Development Command, Hypersonic Research Aircraft, January 31, 1958, reprinted in *ibid.*, 283.

all internal Air Force correspondence concerning selecting a Dynasoar contractor and conducting Step I of the program did not mention NACA. The NACA official writing the memo explained that the Air Force's directives on the project "... do not imply that Dyna Soar I which appears as a first phase of weapons system development is to be treated differently than any other weapons system development" in which the NACA is not closely involved with major decisions and actions. Therefore, the Air Force's basic proposal would be "that NACA enter into the Dyna Soar I project in the role of consultant only. . . . In the role of a consultant only we would feel that our responsibilities would rest in mainly expressing opinions for which we had been asked." The author of the memo to Dryden said the NACA had to ascertain exactly what NACA's responsibilities with Dynasoar were to be or else "... we might find ourselves involved in something for which we had neither adequate finances nor manpower."⁸⁴

This ambiguity meant that an official AF-NACA Memorandum of Understanding (MOU) in response to Putt's January letter was not forged until May 1958. It stated, "Overall technical control of the project will rest with the Air Force, with the advice and assistance of the NACA. . . . Financing of the design, construction, and Air Force test operation of the vehicles will be borne by the Air Force. . . . Management of the project will be conducted by an Air Force project office within Headquarters ARDC." Therefore, NACA's (and later NASA's) participation would be largely in the area of technical consultation "... to maximize the vehicle's capabilities from both the military weapon system development and aeronautical-astronautical research viewpoints." All flight testing would be accomplished by a NACA-USAF-contractor committee "chaired by the Air Force."⁸⁵ The Air Force's role in all phases of Dynasoar's research and development was clearly predominant at the beginning of the project's NACA-AF

⁸⁴ Hartley A. Soule, Research Airplane Projects Leader, NACA, memorandum to NACA Headquarters, Role of NACA in Development of Hypersonic Glide Rocket Conceptual Test Vehicle, Dyna Soar I, February 10, 1958, folder: Dyna Soar Proposals & Evaluation, DoD subseries, Federal Agencies series, NHDRC, 1-2.

⁸⁵ Thomas D. White and Hugh Dryden, Memorandum of Understanding, Principles for Participation of NACA in the Development and Testing of the 'Air Force System 464L Hypersonic Boost Glide Vehicle (Dyna Soar I), May 20, 1958, reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra, 284-85.

interface and would remain so as NASA was created and until the project's termination in December 1963.⁸⁶

Tenuous Support for Dynasoar and the USAF Response

The USAF was politically savvy enough to realize that as a costly R&D project at least partially devoted to delivering weapons from space, the Dynasoar had a shaky political foundation at best within the Eisenhower administration. Only 28 days after NASA started operations, an internal BoB memo assessed Dynasoar and concluded, "The project as now conceived appears to be premature if not entirely impractical as a weapons project, and overly expensive as an experimental vehicle project. In the 1960 budget considerations, we are again recommending strongly that it be canceled."⁸⁷ The scientists so influential in the creation of Eisenhower's space policy continued to be skeptical. Piland told Killian after NASA's creation that, "The Air Force plans to use the glide missile [Dynasoar] for reconnaissance and bombardment. The coming of the reconnaissance satellite has brought the need of this vehicle for reconnaissance into question. . . . As a bombardment vehicle the glide missile must be compared with the ballistic missiles, including Minuteman."⁸⁸ Piland also relayed that NASA believed that the Dynasoar was "a reasonable extension of the research airplane concept" and as such would be valuable for studying and evaluating flight problems in the hypersonic regime but nevertheless, "The NASA maintains its usual

⁸⁶ For instance, on November 14, 1958, Glennan and White signed a new MOU, Principles for Participation of NASA in Development and Testing of the Air Force System 464L Hypersonic Boost Glide Vehicle (Dyna Soar I). However, this document was simply a reiteration of the May 1958 MOU's language but which substituted NASA for the NACA. See folder: X-20 Correspondence, DoD subseries, Federal Agencies series, NHDRC.

⁸⁷ Willis Shapley, Military Division, BoB, Memorandum for BoB Director, Man-in-Space briefing and agenda item for Space Council meeting, October 28, 1958, folder: National Aeronautics and Space Council 1958, box: White House, National Aeronautics and Space Council, 1958-59, NHDRC, 1.

⁸⁸ Robert O. Piland, Memorandum to Killian, Subject: DYNA-SOAR, November 3, 1958, folder: Missiles April-December 1958 (3), box 12, OASST, DDEL, 2. The Minuteman was America's first solid-fuel ICBM; all previous ICBMs were liquid-fueled. Solid-fuel ICBMs were smaller, lighter, easier to maintain in underground silos, more reliable, cheaper, and more quickly available for launching than liquid-fueled ICBMs. PSAC believed Dynasoar would have to be empirically compared to the Minuteman in these categories and merit assessed, just as the liquid-fueled ICBMs had to be compared to the Minuteman and just as, presumably, the Dynasoar in its reconnaissance mode would have to be compared to unmanned, robotic reconnaissance satellites.

position of not commenting on the military utility of the vehicles. The NASA also has not commented on the relative priority of this project."⁸⁹ Nor would NASA do so over the course of Dynasoar's existence.

Piland reiterated, "It is hard to see how the system could be had for less than a billion dollars." He concluded PSAC's evaluation of Dynasoar by stating, "Its desirability as a weapon system has not been clearly established in comparison with reconnaissance satellites and ballistic missiles. The question of the need for a satellite vehicle capable of maneuvering and landing upon re-entry appears to be confused with the need for a glide missile."⁹⁰ Later that month, BoB Director Maurice Stans, in a meeting with Eisenhower, stated, "Since the program [Dynasoar] represents a space experiment, there is considerable question as to whether the program should be pursued with the Department of Defense or with NASA. The discussion of switching the program to NASA was not conclusive."⁹¹ From the USAF perspective, Dynasoar seemed threatened from many sides. The powerful PSAC felt its missions were not justified when compared to unmanned satellites and missiles. The BoB felt it might more properly be under the organizational cognizance of NASA. Finally, the Dynasoar's budget was imperiled. The BoB had withheld \$10 million of the approximately \$18 million that Dynasoar was supposed to have received for FY58. Secretary of the Air Force James Douglas had to ask Secretary of Defense McElroy to intervene on December 4, 1958. After much discussion and intra-DoD wrangling, Deputy Secretary of Defense Quarles issued a memo on January 7, 1959 releasing the \$10 million but emphasized the funds were for R&D purposes only and they did not represent DOD recognition of Dyna-Soar as a weapon system.⁹²

The Air Force responded to these assorted threats to Project Dynasoar by subtly changing the way it presented the project. The USAF's Director of Advanced Technology explained how the Secretary of the Air Force disseminated guidance "... that sub-orbital aspects of Dyna Soar be emphasized. . . . It is

⁸⁹ Ibid., 2.

⁹⁰ Ibid., 2-3. Emphasis in original.

⁹¹ Memcon, November 28, 1958, dated December 9, 1958, folder: Budget, Military FY1960 (4), box 3, Department of Defense subseries, Subject series, Office of the Staff Secretary, White House Office, DDEL, 8.

⁹² James Douglas, Memorandum for Secretary of Defense, Subject: Support of Dyna-Soar Program, December 4, 1958, folder: Dyna-Soar, DoD subseries, Federal Agencies series, NHDRC, 1; Houchin, *The Rise and Fall of Dyna-Soar*, 124.

recommended that the weapon system aspects and the capabilities of Dyna Soar as a space vehicle be avoided." The Air Force should therefore present Dyna Soar as a military test system "... which will explore and solve the problems of hypersonic flight including return from near orbital velocity."⁹³ The Air Force hoped that by emphasizing the testing or R&D functions the Dynasoar would do suborbitally and by downplaying its orbital military missions of reconnaissance and bombardment, it could thereby attenuate some of the pressure coming from individuals questioning its purpose and from those desiring to reduce its budget. One Air Force history explained the Air Force "... had been successful in retaining control of Dyna-Soar by asserting that it has less than an orbital flight capability. ... As a safeguard, the Air Force continued for some time to emphasize the suborbital rather than the orbital characteristics of Dyna Soar while going forward with its development as rapidly as weak funding and strong opposition within OSD permitted."⁹⁴

Internally, however, the Air Force continued to regard Dynasoar as a program leading to an eventual operational weapon system. In a January 1959 document arranged in question and answer format and intended to serve as an internal institutional expression of the USAF's space policy, the Air Force asked itself, "Why shouldn't NASA be conducting development of Dyna Soar?" The answer was, "Because it is not a research vehicle, but an intermediate step to a weapon system." The Air Force pointed to Dynasoar's capability for maneuverable reentry and precision landing and concluded, "We believe this capability is indispensable for any practical, repetitive military use of boosters or orbital system." In trying to head off charges that Dynasoar duplicated Mercury, the Air Force stated, "'Mercury' is a soundly conceived project to meet its objectives which are to put a man in orbit as simply and quickly as possible. It will not give us the capability for controlled flight and precise landing after leaving an orbit as Dyna Soar will."⁹⁵

⁹³ Brigadier General Homer Boushey, Memorandum for Director of Requirements. Subject: Air Force Space Activities. January 8, 1959, K140.11-3, AFHSO, 3.

⁹⁴ Lee Bowen, *An Air Force History of Space Activities, 1945-1959*, SHO-C-64/50 (Washington, DC: USAF HDLO, 1964), 168.

⁹⁵ USAF, Headquarters, Air Force Policy on Space, briefings for the Secretary of the Air Force, January 28-29, 1959, K140.11-13, AFHSO, 12, 14.

For the most part this Air Force tactic of reorienting Dynasoar's external focus to a R&D/test vehicle while maintaining a continuing internal focus on preparing Dynasoar to serve as a weapon system was successful. Dynasoar survived the remainder of the Eisenhower administration, albeit at a low budgetary level when compared to other DoD projects. By April 1959 DDR&E York stated the primary goal for Dynasoar would be suborbital exploration of hypersonic flight and that he considered testing of military subsystems and the attaining of orbital velocities as secondary objectives. He therefore approved \$14.5 million for FY59 funding.⁹⁶ Near the end of 1959 there was another brief flurry of concern within the Air Force that Dynasoar might be transferred to NASA. The CSAF wrote to the Under Secretary of the Air Force in late October, "The Air Force must not lose Dynasoar. Will you please put all of this in context for me?"⁹⁷ Three days later Homer Boushey as Director of Advanced Technology fretted, "The loss of the DYNA SOAR project to NASA appears imminent." He reached this conclusion based upon a DoD budget review session which tentatively removed all FY61 funding for Dynasoar, "contemplating its elimination." Boushey also said he believed Kistiakowsky and York had discussed

and may have decided upon cancellation of DYNA SOAR, with NASA to pick up the pieces as experimental in-house work. NASA plans for MERCURY include winged DYNA SOAR-like vehicles. In a 29 October 1959 high level OSD-NASA presentation on the SATURN (now scheduled for transfer to NASA) Dr. Von Braun justified the choice of 220 inches as the diameter of the second stage SATURN booster (rather than 160 inches) entirely on the basis of assumed DYNA SOAR requirements.⁹⁸

But as NASA continued to focus on Mercury and made no overt attempts to capture managerial control of Dynasoar, this concern over a potential NASA takeover of Dynasoar receded and is not found in any 1960 primary sources. The overriding concern from the Air Force perspective seemed to be the continuing challenging of justifying the program to OSD and then to the executive branch as a whole.

⁹⁶ Houchin, *The Rise and Fall of Dyna-Soar*, 131.

⁹⁷ Thomas D. White Memorandum to Joseph Charyk, October 27, 1959, folder: Chief of Staff Signed Memos, box 26. Thomas White papers, LoC, 1. Emphasis in original.

⁹⁸ Brigadier General Homer Boushey, Director of Advanced Technology and Deputy Chief of Staff for Development, memorandum for the CSAF, Statement of Critical Problem Concerning SATURN, DYNA SOAR, and Air Force Space Responsibilities, October 30, 1959, folder: X-20 Dyna-Soar Documentation, DoD subseries, Federal Agencies series, NHDRC, 1.

The BoB's hostility to Dynasoar continued. BoB Director Stans simply declared at a conference with the President in November 1959, "The Dyna-soar makes no sense at all." Secretary of Defense McElroy retorted "... he had cut the Dyna-soar submission [for FY61] from \$150 million to \$25 million." Eisenhower did not speak to Dynasoar directly, simply saying "... that within five years we must be balancing our budgets, or we will be ruining our defense by swings of the pendulum. ... He asked Mr. McElroy to go over the budget again minutely to make it a little leaner and tougher."⁹⁹ The BoB's bottom line was firm, however: "Since the nation is already committed to the Mercury project for scientific and prestige purposes, it would seem that the possible military benefits do not warrant the continuation of the Dynasoar project at this time."¹⁰⁰ Glennan certainly did not want NASA to become embroiled in a situation in which NASA's Mercury was used as a justification for eliminating Dynasoar. He wrote concisely, "There is no direct relationship between Mercury and DynaSoar."¹⁰¹ The factor of perceived duplication between NASA's Mercury and Dynasoar was not significant during the Eisenhower administration. However, the perceived duplication between NASA's Gemini and Dynasoar would become a key factor in Dynasoar's cancellation in 1963.

Top Air Force leaders continued to plan the long-term structure of the program, despite the lean budgets and uncertain high-level support. In November 1959 the Air Force estimated total program cost of \$638 million by FY66 and outlined a three-step program. Step I would feature a full-scale but minimum size unmanned Dynasoar vehicle for tests on the ground, dropped from a B-52 bomber and on a modified Titan ICBM. Step II tests would begin to incorporate the Dynasoar's internal equipment for global range and orbital testing of military subsystems "and for initial operational test and use." During this step the Dynasoar would be launched by a larger booster and was expected "to achieve orbital veloc-

⁹⁹ Memcon, 16 November 1959, dated December 2, 1959, folder: Budget, Military FY 1961 (4), Department of Defense subseries, Subject series, Office of the Staff Secretary, White House Office, DDEL, 8-9.

¹⁰⁰ Internal BoB Memorandum from its Military Division, to a Dr. Reid, November 23, 1959, folder: National Aeronautics and Space Council 1959, box: White House, National Aeronautics and Space Council, 1958-59, NHDRC, 1.

¹⁰¹ Glennan, Memorandum to NASA leaders, January 2, 1960, Folder: Chronological January 1960, Glennan subseries, Administrators series, NHDRC, 5.

ity.” Finally, Step III was designed to provide an operational military weapon system and use either the Saturn or another larger booster.¹⁰² Despite these well-laid plans, Dynasoar’s financial reality was a different matter. A status report of December 1959 complained the Assistant Secretary of the Air Force had refused to release more than \$1 million of the \$35 million programmed for Dynasoar in FY60. The report also stated that the \$58 million programmed for FY61 was inadequate and would cause a delay of at least a year in the program.¹⁰³

Another challenge by 1960 was the fact that the Air Force’s plan to emphasize the suborbital R&D aspect of Dynasoar had succeeded so well that OSD began to consider that rationale the only reason for Dynasoar’s existence, discounting what the Air Force felt was its real and ultimate, albeit downplayed, significance as a weapon system. The Air Force’s Directorate for Advanced Technology reported on meetings with DDR&E York and Undersecretary of the Air Force Joseph Charyk (responsible within the Air Force context for its R&D activities). According to the Directorate, York and Charyk now believed: that “orbit is not an acceptable objective” for Dynasoar; that any vehicle designed to perform inspection of hostile satellites (another potential Dynasoar mission, along with bombardment and reconnaissance) should not have wings but should be like Mercury; that Dynasoar’s only certain primary objective was “exploration of the hypersonic regime; that “there is as yet no military requirement for winged re-entry, however . . . it is acceptable to explore the hypersonic regime;” and that the Dynasoar should be like the X-15 in that it have no foreseeable military use or be made to lead to development of any later weapon system.¹⁰⁴ Since these two men were the ones most directly responsible for the USAF’s R&D program, these conclusions did not bode well for converting, at some later time, the Dynasoar from a R&D platform

¹⁰² Office of the CSAF, Record of Decision, Subject: The Dyna Soar Program, to Deputy CSAF for Development and Deputy CSAF for Material, November 17, 1959, folder: Air Force Council Decisions 1959, box 25, Thomas White papers, LoC, 1-2. See also USAF, Current Status Report, Strategic Mission Area, 620 A-DYNA SOAR, February 1960, IRIS 1003000, AFHSO, 1.

¹⁰³ Vice CSAF LeMay to CSAF White, Status Report on Project Dynasoar, December 15, 1959, folder: 4-5 Missiles/Space/Nuclear, box 36, Thomas White papers, LoC, 1.

¹⁰⁴ Lieutenant Colonel Benjamin H. Ferer, Office of the Assistant for Advanced Technology, Memorandum for Record, Subject: Summary of Opinions Believed to be Held by Drs. York and Charyk on Dyna Soar, March 14, 1960, IRIS 1003000, AFHSO, 1. Emphasis in original.

into an operational vehicle for reconnaissance, bombardment, or satellite inspection. Nevertheless, at a NASA-AF conference in April 1960, the USAF representative stated, "The fundamental objective of the Dyna-Soar program is to establish a technological basis for the development of future military weapon systems. . . . Dyna-Soar must be able to test military equipment and the man-machine relationship. Dyna-Soar must achieve orbital capability."¹⁰⁵

Therefore, at the end of the Eisenhower administration Dynasoar's political status was stable in the sense that R&D was continuing but it was not hopeful from the Air Force's long-term perspective of fielding an operational weapon system. Support at the civilian OSD leadership level was at best lukewarm and within the broader executive branch such as PSAC and BoB Dynasoar could encounter outright opposition. For instance, PSAC's Strategic Systems Panel monitored Dynasoar and in September 1960 concluded that while human spaceflight in the hypersonic realm was a legitimate research objective, ". . . a program to develop these capabilities might more logically be a prime NASA responsibility rather than that of the Air Force, [but] at this late date it would probably be a mistake to shift responsibilities."¹⁰⁶ Panel member George Rathjens demurred from the panel's endorsement of human spaceflight in the hypersonic field and stated unmanned vehicles could gather sufficient information: "I have not attempted to make the arguments that the man is needed, because I do not understand them. In fact, I am inclined to believe he is not needed and that the technology can and should be developed largely with wind tunnel and other work on the ground, and with instrumented drones." Rathjens proposed a radical reorientation of the Dynasoar program that eliminated the human presence and emphasized technological development; such a change would permit quicker technological development and cost only \$100 million, compared to a billion dollars for the manned version. Rathjens added that Kistiakowsky was concerned Dynasoar ". . . may develop into another gigantic program with emphasis on a poorly-defined or nonsensical strategic operational requirement. . . . He stressed that he thought the program must not be considered in isolation,

¹⁰⁵ Colonel W. L. Moore, Wright Air Development Division, Dyna-Soar Program Status, remarks at the USAF-NASA Conference on Lifting Manned Hypervelocity and Reentry Vehicles, Part II, April 11-14, 1960, IRIS 1003000, AFHSO, 3-4. Emphasis in original.

¹⁰⁶ PSAC, Strategic Systems Panel, report on Dynasoar to Kistiakowsky, September 17, 1960, folder: Missiles July-September 1960 (6), box 12, OSAF, White House Office, DDEL, 1.

but in the context of other programs such as those for strategic delivery systems, reconnaissance systems, and MERCURY and APOLLO."¹⁰⁷

Whatever his subordinates' opinions may have been concerning Dynasoar, Eisenhower was not enthusiastic about the project. At a NSC meeting in December 1960 DDR&E York informed Eisenhower that the Dynasoar program would cost at least \$700 million. Eisenhower replied ". . . that Dynasoar would be a desirable project to play around with if unlimited funds were available. However, he was not in the least impressed by the usefulness of Dynasoar as a project which would compete with other defense programs for scarce funds." Eisenhower further explained ". . . that his comments on Dynasoar had been based on his view of the national security race rather than the technological race. . . . The President believed that Dynasoar as well as a great many research and development projects were useful concepts but he was unable to understand what practical utility a great many of these concepts would have."¹⁰⁸

Nevertheless, the Dynasoar's programmatic status at the end of the Eisenhower administration seemed relatively stable with a FY61 budget of \$87 million.¹⁰⁹ Contracts had been let for the glider, the launch vehicle and the launch vehicle engines. Eisenhower's final Aeronautics and Space Report described NASA's support of Dynasoar: "NASA is carrying out a wide range of research activities in its laboratories and wind tunnels to determine configurations that can best stand the stresses of space flight."¹¹⁰ NASA's Long Range Plan of January 1961 stated concerning Dynasoar: "NASA is responsible for the flight and ground instrumentation necessary to obtain the required flight data and is actively par-

¹⁰⁷ George W. Rathjens, member of PSAC Strategic Systems Panel, memorandum for other members of the Panel, September 23, 1960, folder: Missiles July-September 1960 (6), box 12, OSAST, White House Office, DDEL, 1-2.

¹⁰⁸ Memorandum of Discussion at the 469th Meeting of the National Security Council, December 8, 1960, reprinted in Edward C. Keefer and David W. Mabon, editors, *Foreign Relations of the United States, 1958-1960, Volume 3, National Security Policy: Arms Control and Disarmament* (Washington, DC: USGPO, 1996), 502-03.

¹⁰⁹ Headquarters, USAF, Development Directive for System 620A - DYNA SOAR (Step I), Hypersonic Glider System, October 12, 1960, IRIS 1003000, AFHSO, 1.

¹¹⁰ Executive Office of the President. *U.S. Aeronautics and Space Activities: January 1 to December 31, 1960*. Report to Congress from the President of the United States, January 18, 1961. NSA MUS document 324, p. 11.

ticipating in the preflight technical decisions and in supporting research."¹¹¹ NASA's Dynasoar involvement clearly continued to be supporting and consultative in nature and did not include policy decisions. However, the existence of other human spaceflight programs, under NASA's active management, would soon become intertwined with Dynasoar's fortunes not at NASA's behest, but due to Secretary of Defense Robert S. McNamara's drive for consolidation and efficiency.

Project Mercury and the DoD Role

NASA's human spaceflight program, Project Mercury, requires less extensive coverage than Dynasoar in the context of this dissertation for two reasons. First, an exhaustive history of the program already exists.¹¹² Second, after the decision was made to award the primary human spaceflight mission to NASA in the summer of 1958 (see above), the NASA-DoD relationship in Project Mercury then became relatively straightforward and utilitarian: DoD, and particularly the Air Force, provided absolutely critical support for the program and established a formal structure to manage such support. Policy-level concerns rarely intruded upon the process whereby NASA was essentially dependent on the DoD for the hardware, personnel and facilities necessary to execute Project Mercury. The DoD and the Air Force provided the equipment, people, ranges, tracking stations, etc. NASA required, knowing that by doing so they would further America's experience in human spaceflight, and assist the creation of an infrastructure that would, in an emergency, be available for national defense purposes.

Most Mercury operations and actual launches took place during the Kennedy administration. However, the Eisenhower administration laid the foundation. During the Eisenhower era the only actual launches were unmanned and consisted of one Mercury-Atlas (MA) combination in which the capsule was mated with a modified Atlas ICBM and two Mercury-Redstone (MR) combinations in which the capsule was mated with Army's Redstone ballistic missile. One MR combination had a successful suborbital flight, reaching an altitude of 135 miles, 4,200 mph and impacting 235 miles down range. However, a

¹¹¹ NASA, Office of Program Planning and Evaluation, NASA Long Range Plan, January 12, 1961, folder: NASA Long Range Plan, box 1, National Aeronautics and Space Administration: Documents Relating to the space program, 1953-62, DDEL, 17.

¹¹² Loyd S. Swenson Jr., James M. Grimwood, Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966).

second MR combination on November 21, 1960 "marked the absolute nadir of morale among all the men at work on Project Mercury" when it lifted off the launch pad at most 4-5 inches, settled back, jettisoned the escape tower, and deployed its parachutes. This MR failure "was the most distressing, not to say embarrassing, failure so far in Project Mercury. Critics waxed unrestrained."¹¹³ Worse, the MA launch failed when the Atlas exploded approximately 65 seconds after launch. This was especially distressing because the more powerful MA combination was programmed to launch all but the first two American astronauts into space. The Mercury program as Kennedy took office therefore had only an overall 33 percent test success rate in its first three test launches, far less than that required for a human spaceflight system, and a 100 percent failure rate with the crucial MA combination.¹¹⁴ Mercury's status was tenuous at best at the beginning of the Kennedy administration. One trio of analysts concluded after the initial Mercury test launch failures, "Mercury looked horribly like another Vanguard."¹¹⁵ The scholarly retort to this was, "If Project Mercury were on the verge of technological bankruptcy, as some critics claimed, the problem was that man was still land-locked by inadequate boosters."¹¹⁶ Finally, Mercury was supposed to be a sort of "quick and dirty" way for America to quickly put a human in orbit. The original cost estimates for the entire program were \$200 million but expenditures by mid-1960 had already risen to \$250 million.¹¹⁷

¹¹³ Swenson, et. al., 297.

¹¹⁴ Concise launch data can be found in NASA, *NASA Pocket Statistics, 1996 Edition* (Washington, DC: USGPO, 1996) while a full accounting is in Swenson et. al., *This New Ocean*, 133ff and Appendix D, Flight Data Summary, 638-39. It should be noted that there were other developmental flights in the Mercury program using a hybrid test rocket called Little Joe. It was a clustering of four smaller solid-fueled Sergeant rockets that NACA had regularly used in scientific experiments at PARD. Its advantage was a much lower cost than either Redstone or Atlas. Basic Mercury capsules were launched to a maximum altitude of 100 miles using Little Joe rockets for purposes of collecting basic aerodynamic and performance information on the capsule's configuration and design. See Swenson et. al., 105, 123ff.

¹¹⁵ Hugo Young, Bryan Silcock, and Peter Dunn, "Why We Went to the Moon," *Washington Monthly* (April 1970): 31.

¹¹⁶ Swenson, et. al., *This New Ocean*, 272.

¹¹⁷ Derek W. Elliott, *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963* (Ph.D. dissertation, George Washington University, 1992) 114.

The NASA-DoD interface in Mercury began with the creation in mid-September 1958 of the Joint NASA-ARPA Manned Satellite Panel, with membership 6-2 in favor of NASA. Soon, NASA had ordered nine Atlas (the Air Force would eventually provide 14), eight Redstone and 2 Jupiter missiles from the DoD to begin the Mercury program.¹¹⁸ Glennan wrote Deputy Secretary of Defense Thomas Gates in July 1959 to acknowledge, "We [in NASA] have recognized from the beginning the very considerable reliance that must be placed upon resources under the custody of the Department of Defense if the program is to be successful without an inordinate expenditure of time and money." He asked Gates to keep the organizational structure governing DoD's assistance to NASA in Mercury "as simple and straightforward as possible with delegation of authority to the field Commander to the maximum extent possible."¹¹⁹ Gates complied on August 10, 1959 by naming Air Force Major General Donald Yates, the Commander of the Atlantic Missile Range (AMR) complex of facilities in Florida, as the DoD Representative for Project Mercury who would serve as the single point of contact for the NASA-DoD Mercury operational interface.¹²⁰ Over the next few years this position was strengthened so that the DoD Representative could exercise control not only over DoD tracking support, but also over the recovery, launch, booster, medical, and all other support activities.¹²¹ Lieutenant General Leighton Davis replaced Yates as AMR commander and DoD Mercury Representative in July 1960.

A sample USAF accounting of its support for Mercury from November 1959 reveals four major categories. First was launch support in which AMR personnel: prepared launch operations plans; provided the launch vehicle and the personnel required to launch it; provided the launch pads and hanger areas for the booster and the capsule; and provided standard launch services such as range safety and se-

¹¹⁸ Swenson, et. al., *This New Ocean*, 110, 123.

¹¹⁹ Glennan letter to Thomas Gates, July 22, 1959, folder: DOD Support of Mercury (1959-1963), Mercury series, NHDRC, 1, 3.

¹²⁰ Thomas Gates, Memorandum for the service secretaries, DDR&E, Chairman of the JCS, Assistant Secretaries of Defense, and ARPA Director, Subject: Assignment of Responsibility for DOD Support of Project Mercury, August 10, 1959, IRIS 1002999, AFHSO, 1.

¹²¹ For a detailed look at this process see Henry E. Clements, Colonel, USAF, *The Coordination of Manned Spaceflight Operations Between DOD and NASA*, Student Research Report No. 31 (Industrial College of the Armed Forces, April 1969).

curity. Second was tracking support in which the AMR: provided space for NASA data collection equipment in AMR facilities; collected data using AMR equipment in Florida; operated NASA equipment located at worldwide AMR tracking stations; provided logistical and maintenance support to worldwide NASA stations; and operated NASA stations located at worldwide AMR locations. Next was recovery support in which the Air Force provided assistance in planning recovery operations as well as provided search and rescue services. The Navy of course provided the surface vessel component of the recovery forces. Finally was transportation in which AMR personnel and vehicles provided all short-notice or scheduled passenger and cargo carrier services for NASA. FY60 costs totaled \$17.4 million at AMR, of which only \$10.6 million was reimbursed.¹²²

The general trend of assigning numerous military personnel to NASA was surveyed in chapter 4. One famous example of this was America's first seven astronauts, often collectively termed the Mercury Seven. They were all military officers. Glennan recalled his initial question to Eisenhower on this issue. Eisenhower simply responded, "Of course, you will use military men. They are in the service for matters of this kind."¹²³ Another document records Eisenhower as supporting military officers serving as America's first astronauts because "... they would have had their disciplinary training behind them."¹²⁴ Tom Wolfe's *The Right Stuff* tells the romanticized but nevertheless fascinating story of Scott Carpenter, Gordon Cooper, John Glenn, Virgil "Gus" Grisson, Walter Schirra, Alan Shepard, and Donald "Deke" Slayton.¹²⁵ A scholarly assessment states that while using military test pilots "greatly simplified the astronaut selection procedure" and thereby reduced required training time, "the fame of the astronauts quickly grew

¹²² Colonel John L. Martin, Deputy Director of Advanced Technology, Deputy Chief of Staff for Development, report to Secretary of the Air Force, Legislative Liaison, on Project Mercury, November 10, 1959, K140.11-7, AFHSO, 1-4.

¹²³ Oral history interview of T. Keith Glennan, April 5, 1974, folder: Glennan Interview 4/5/74, Glennan subseries, Administrators series, NHDRC, 20.

¹²⁴ Memcon, December 18, 1958, dated December 22, 1958, folder: Staff Notes - December 1958 (1), box 38, DDE Diary Series, Ann Whitman file, DDEL, 1.

¹²⁵ New York: Sloan, Duell, and Pearce, 1979.

beyond all proportion to their current activities and their preflight mission assignments.”¹²⁶ The military officers who served as astronauts should most properly be seen as perhaps the most visible component of DoD support to Project Mercury, but nevertheless only one small part of a much larger military effort to ensure NASA’s human spaceflight project proceeded as quickly as possible within the limits of available resources.

At the end of his tenure, Glennan was satisfied with the DoD’s support of Mercury. He wrote the Secretary of Defense to thank him for the “. . . excellent cooperation and support you are giving us in this difficult research and development task. This well-integrated operation seems to me to speak for itself in elegant terms of the kind of cooperation that exists between the military and civil components of our space program.”¹²⁷ Even when NASA undertook unpleasant tasks such as diagnosing why the July 29, 1960 MA launch exploded 65 seconds after launch it made a point to include in the final report that, “All Department of Defense support for the operation was very good.”¹²⁸ Looking ahead to the end of the Mercury program in June 1963, one calculation showed total DoD support valued at \$133 million (\$67.6 million for launch vehicles), of which NASA reimbursed \$99.8 million.¹²⁹

Having discussed DoD support of NASA in this chapter and the preceding chapter, the question arises of whether there was any reciprocal support by NASA for the DoD. Concerning specific programs or services during the Eisenhower administration there was not. There existed only the general notion that by developing space technology, facilities, and experience, NASA was creating a national asset that could, in times of crisis, be made available for national security purposes. NASA Deputy Administrator Dryden explained, “NASA’s role in the national security program is the development of space technology

¹²⁶ Swenson et. al., 160.

¹²⁷ Glennan letter to Thomas Gates, December 19, 1960, folder: Defense, Department of, Glennan subseries, Administrators series, NHDRC, 1.

¹²⁸ Cited in Swenson et. al., 278.

¹²⁹ Gerald Cantwell, *The Air Force-NASA Relationship in Space, 1958-1968* (Washington, DC: Department of the Air Force, Office of Air Force History, October 1971, reprinted November 1990), 23.

and the conduct of a program of scientific exploration in the atmosphere and in space."¹³⁰ Glennan told ARPA Director Johnson, "... my own belief [is] that all of the work of the National Aeronautics and Space Administration will eventually find military application and therefore has military implications."¹³¹ Glennan testified to Congress on this point: "I have never found it possible to say, 'This element of our program is civilian space alone.' In practically everything we are doing, there must be some military interest. . . . I am very certain that many of the things which we are doing in space science are going to fall right into their laps as developments in information which will be useful to them in the further development of an operational system."¹³² During the Kennedy and Johnson administrations NASA would render some very limited direct assistance to the DoD in assorted projects, but the standard presentation to congressional and executive branch leaders continued to be that NASA contributed to the nation's defense inasmuch as it was permitted to develop the technology, facilities, and operational experience of space-flight.

Looking To The Future

Neither NASA nor the DoD were anchored solely in the contemporary realities of pursuing Mercury and Dynasoar and dealing with the numerous associated challenges. Both organizations looked to future, follow-on human spaceflight projects such as space stations and lunar landings. As early as July 10, 1959 NASA held a conference, in NASA's words, "... to study the various aspects of placing a manned space laboratory in operation. . . . This project is envisioned as one of the initial steps in the actual landing of a man on the moon in 10-15 years." The participants at this conference even reached preliminary design decisions such as that the station should have a one-year life, incorporate a two-person crew, have a near equatorial 400 mile altitude orbit, be comprised of a rigid cylinder with a parabolic solar

¹³⁰ Hugh Dryden, memorandum to James S. Lay, Executive Secretary, NSC, September 16, 1959, folder: National Security Council, 1955-1980, box: White House, National Security Council, NHDRC, 1.

¹³¹ Glennan letter to Roy Johnson, November 17, 1958, folder: ARPA (Documentation), DoD subseries, Federal Agencies series, NHDRC, 1.

¹³² Congress, Senate, Committee on Aeronautical and Space Sciences, Subcommittee on Government Organization for Space Activities, *Government Organization for Space Activities*, Report No. 806, 86th Congress, 1st Session, August 25, 1959, p. 6.

energy collector, and weight 7,000 pounds.¹³³ NASA's Langley Laboratory continued to study the space station concept and produce preliminary designs throughout the Eisenhower and Kennedy administrations. One from October 1960 shows an inflatable space laboratory based on the Mercury spacecraft.¹³⁴

The Air Force also had on-going study efforts of space stations/laboratories. Seven USAF contractors studied a Military Test Space Station (MTSS) from 1958 to 1961 and designed a small station to be available in the mid-1960s. These detailed MTSS studies provided the Air Force with the raw data needed to design the Military Orbital Development System (MODS) in 1962 which subsequently fed into the MOL design process in 1963 (see Chapter 8).¹³⁵ It must be stated, however, that these studies were "at a relatively low level of effort" and that there was little progress toward any operational platform due to ". . . the lack of a validated requirement for the presence of military man in space, particularly in view of the Nation's dedication to peaceful use of space."¹³⁶

Concerning the drive to reach the moon, the Air Force's early study efforts in this area were discussed in Chapter 4 in the context of interservice rivalry. These studies continued throughout NASA's early years, again at a low level and hampered by the perception of the lack of any firm requirement for a military presence in the lunar environment created by the space for peace national policy. An Air Force colonel responsible for monitoring the Air Force's lunar study effort and coordinating it with NASA wrote in July 1960, "Although military requirements in the lunar area are not now fully defined, the moon clearly represents an area over which conflicts may arise." The officer then briefly described SR-183, the

¹³³ Beverly Z. Henry, Jr., Aeronautical Research Engineer, Memorandum for NASA Associate Director, Subject: Langley Manned Space Laboratory Effort, October 5, 1959, folder: Skylab/AAP Documentation 1959, Skylab series, NHDRC, 1.

¹³⁴ Roland W. Newkirk, Ivan D. Ertel, Courtney G. Brooks, *Skylab: A Chronology*, NASA SP-4011 (Washington, DC: USGPO, 1977), 15.

¹³⁵ USAF, Insert for the Record to the House DoD Subcommittee on Appropriations, April 1, 1965, IRIS 1002996, AFHSO, 2.

¹³⁶ John Coulter, Colonel, and Benjamin L. Loret, Major, "Manned Orbiting Space Stations," in Eldon W. Downs, editor, *The U.S. Air Force in Space* (New York: Frederick A. Praeger, 1966), 37.

USAF's examination of a Lunar Observatory, and mentioned that a separate study of "the military aspects of the moon" was currently "undergoing evaluation."¹³⁷

Much more important for the future of American space policy was NASA's institutional decision during the Eisenhower administration, long before Kennedy's lunar landing decision, that a lunar landing would be NASA's primary long-range goal in space. The complicated process whereby NASA internally reached this decision is ably presented in John Logsdon's seminal *The Decision to Go to the Moon*.¹³⁸ The details are not germane to this dissertation's discussion but the bottom line is: "NASA planners, in mid-1959, chose a manned lunar landing as the appropriate goal of the second-generation NASA manned space flight program. That is, almost two years before the Kennedy political decision to attempt a manned lunar landing program, NASA had chosen such a program on technological grounds as the logical successor to Project Mercury. . . ."¹³⁹ NASA could examine and incorporate not only the USAF's study effort, but also the Army's Project Horizon and the results of the many industrial contractors that had contributed to these studies. In addition, NASA's early decision to focus on the lunar landing meant it got a sort of "head start" on planning for the specifics of vehicle configuration, launch modes, propulsion requirements and myriad other operational details associated with traveling to and returning from the moon. For instance, Logsdon says that without NASA's early R&D into new fuel-handling and engine technologies required for liquid hydrogen and liquid oxygen ". . . it is unlikely space experts would have told Kennedy in 1961 a lunar landing was possible by 1967."¹⁴⁰ This held true for other operational and technical questions, leading Logsdon to conclude that by Kennedy's decision in 1961, ". . . for some time and in some detail, Americans had been thinking about how to go to the moon."¹⁴¹

¹³⁷ Colonel J.W. O'Neill, ARDC/BMD, Deputy Chief of Staff for Plans and Operations, Memorandum, to Colonel Donald Heaton, NASA Technical Assistant to the Director, Launch Vehicle Programs, Subject: Air Force Lunar Research Team, July 30, 1960, folder: USAF Documents/Correspondence, 1957-1961, DoD subseries, Federal Agencies series, NHDRC, 1.

¹³⁸ John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass. and London, England: The MIT Press, 1970), 40-62.

¹³⁹ *Ibid.*, 40.

¹⁴⁰ *Ibid.*, 58.

¹⁴¹ *Ibid.*, 62.

Even though Eisenhower did not support, endorse, or fund a lunar landing effort, the R&D NASA did carry out with internally available funds permitted it to address many technological and operational questions. NASA's final Eisenhower era long-range plan dated January 12, 1961 simply stated, "Manned space flight is a key element in the overall NASA program. . . . the program for the next ten years is directed toward providing the means for manned flight to the moon. . . . When a national decision is made to proceed with a manned lunar exploration program, design and construction of a spacecraft for manned circumlunar flight will be undertaken. This plan assumes that a decision will be made to proceed."¹⁴² While not officially sanctioned to begin Project Apollo under Eisenhower, NASA planned for it as much as it could and was biding time until the next president, hopefully, gave it formal approval. Dryden stated quite honestly, "We were trying to get in a position to make proposals. . . . A new group was coming in and NASA needed a new sales pitch."¹⁴³ NASA's patrons in Congress urged even bolder action: "A high priority program should be undertaken to place a manned expedition on the moon in this decade. . . . NASA's 10-year program is a good program, as far as it goes, but it does not go far enough."¹⁴⁴

A Brief Note Concerning Reconnaissance Satellites and the Creation of the NRO

The author does not wish to create the impression that only two institutions, NASA and the DoD, conducted America's space program. A third organization emerged late in the Eisenhower administration to manage the reconnaissance satellite programs and eventually became the third major participant in the United States space program. This body was originally called the Office of Missile and Satellite Systems in the fall of 1960 but approximately a year later, during the Kennedy administration, it was renamed the

¹⁴² NASA, Office of Program Planning and Evaluation, NASA Long Range Plan, January 12, 1961, folder: NASA Long Range Plan, box 1, National Aeronautics and Space Administration: Documents Relating to the space program, 1953-62, DDEL, 8.

¹⁴³ Oral history interview of Hugh Dryden, March 26, 1964, folder: Dryden, Mercury Tape, Dryden subseries, Deputy Administrators series, NHDRC, 10.

¹⁴⁴ Congress, House Committee on Science and Astronautics, *Space, Missiles, and the Nation*, July 5, 1960, pp. 55-56, as cited in Eugene M. Emme, "Historical Perspectives on Apollo," *Journal of Spacecraft and Rockets* 5 (April 1968): 374.

National Reconnaissance Office (NRO). The NRO was then and still is under joint USAF-CIA management. Only in 1992 was the existence of the NRO officially declassified.

Prior to the NRO's creation America's first reconnaissance satellite program was pulled out of the Air Force, reassigned to a joint USAF-CIA management team, and rechristened CORONA. Subsequently, the Air Force continued in its attempt to design and construct its own independent reconnaissance satellite, called SAMOS. Thus, not only was there continuing tension between the DoD and NASA over assorted issues, there was also continuing strain and even resentment between the Air Force and the CIA over the direction and composition of the United States reconnaissance satellite program. It was CORONA, operating under its unclassified cover program called DISCOVERER, which conducted the first successful launch of an American reconnaissance satellite in August 1960. One analyst described this event as "... perhaps the most important development in military technology since the atom bomb. The spy satellite revolutionized the intelligence business."¹⁴⁵

Among the numerous questions Eisenhower's scientific advisers intensely studied after Sputnik were reconnaissance satellites.¹⁴⁶ After much discussion, early in February 1958 Eisenhower accepted a recommendation that a small part of the Air Force's 117L program featuring a satellite with a returnable film capsule would be taken from the USAF and placed under joint management of Air Force Brigadier General Osmond Ritland and the CIA's Richard Bissell for accelerated development. Though designed as an interim program, CORONA in fact "... would become the backbone of our entire intelligence collection system for the next 12 years."¹⁴⁷ Despite the difficulties posed by numerous technical challenges

¹⁴⁵ Jeffrey Richelson, "From CORONA to LACROSSE: A Short History of Satellites," *Washington Post*, February 25, 1990, B1.

¹⁴⁶ For the specifics of this process and the questions considered see Gerald Haines, "The National Reconnaissance Office (NRO): Its Origins, Creation, and Early Years," in the forthcoming *Eye in the Sky* (Washington, DC: Smithsonian Institution Press), 8-15 in manuscript copy. Haines is the first person to serve as NRO Historian, a position only created after the existence of the NRO was declassified in 1992. Kenneth E. Greer, "CORONA," *Studies in Intelligence*, Supplement 17 (Spring 1973) in Kevin C. Ruffner, editor, *CORONA: America's First Satellite Program*, CIA Cold War Records (Washington, DC: Center for the Study of Intelligence, 1995) also has useful information applicable to CORONA's history.

¹⁴⁷ Albert D. Wheelon, "Lifting the veil on CORONA," *Space Policy* 11 (November 1995): 251. Wheelon served as the CIA's first Deputy Director for Science and Technology starting in 1963 and it was under his leadership that the CORONA program flourished.

and perfecting the procedure for aerial recovery of film capsules from space. the thirteenth CORONA launch on August 13, 1960 involved the successful recovery of a capsule from space (without film). The fourteenth CORONA launch on August 18, 1960 did carry a complete photographic system, took pictures, and had its film successfully recovered and processed.¹⁴⁸

Before the NRO's establishment in late 1961, "The CORONA program operated under a loose, unstructured arrangement by which the CIA and the Air Force jointly ran the effort. . . . For a time the relationship worked well."¹⁴⁹ But concern grew within the Eisenhower administration that two separate reconnaissance satellite programs existed: the joint CIA-USAF CORONA venture, and the independent Air Force effort called originally 117L (part of which had been extracted and rechristened CORONA), then renamed SENTRY, and finally SAMOS. Science adviser Kistiakowsky commented on the ". . . unbelievable chaos among the highly classified projects - the piling up of one project on top of another without any effective mechanism for evaluating even the potential usefulness of each." In particular he said that the reconnaissance satellite area was "a very distressing situation" which by May 1960 involved "administrative chaos" and "technical troubles."¹⁵⁰ Eisenhower finally stepped in and ordered Secretary of Defense Thomas Gates to recommend an overall management scheme for reconnaissance satellites. Gates in turn appointed a panel consisting of Kistiakowsky, Undersecretary of the Air Force Joseph Charyk (who would become the NRO's first Director) and Deputy DDR&E John Rubel to conduct the actual investigation.¹⁵¹

¹⁴⁸ Oral history interview of Schriever, July 2, 1996, by the author; Lockheed Corporation, Lockheed Press Release, CORONA Program Profile, May 1995, SPI unnumbered document, 2. Lockheed was a prime contractor on the CORONA program whose functions included technical adviser, integrator of all CORONA equipment other than the Thor booster, developing the Agena upper stage, and leading the test, launch, and on-orbit control operations. When CORONA was finally declassified in 1995, it received permission to release a history of the CORONA program. This press release is a synopsis of that history.

¹⁴⁹ Haines, 16.

¹⁵⁰ George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology* (Cambridge, MA and London: Harvard University Press, 1976), 45, 196, 245.

¹⁵¹ Eisenhower, Letter to Gates, June 10, 1960, folder: Reconnaissance Satellites 1960, box 15, Executive Secretary Subject File subseries, NSC Staff Paper Series, White House Office, DDEL, 1. Jeffrey

Kistiakowsky wrote that his group recommended a direct line of command from the Secretary of the Air Force to the officer in charge of the USAF's reconnaissance satellite program and that the joint CIA-USAF management of other reconnaissance satellite programs continue.¹⁵² Eisenhower approved these recommendations on August 25, 1960 and the Air Force created an Office of Missile and Satellite Systems to manage SAMOS in September.¹⁵³ It was not until a year later that the Office of Missile and Satellite Systems was renamed the NRO with an organizational structure explicitly recognizing joint CIA-USAF management responsibility. NRO's current historian explained that

on 6 September 1961, CIA and the Air Force officially signed a charter establishing a National Reconnaissance Program (NRP). Under that agreement, a covert National Reconnaissance Office (NRO) would finance and control all overhead reconnaissance projects. The NRO was to be managed by a joint directorship of the CIA and the Air Force reporting to the Secretary of Defense. . . . The Air Force provided the missiles, bases, and recovery capability for the reconnaissance systems. The CIA, in turn, conducted research and development, contracting, and security. The agreement also left the CIA in control of the collection program.¹⁵⁴

Finally, only one day after Eisenhower approved the Gates/Kistiakowsky recommendations that led to the NRO's creation, he also issued a directive establishing a new and entirely separate security classification system for reconnaissance satellites: "I hereby direct that the products of satellite reconnaissance, and information of the fact of such reconnaissance . . . shall be given strict security handling under the provisions of a special security control system approved by me. I hereby approve the TALENT-KEYHOLE Security Control System for this purpose." Eisenhower emphasized that anyone with access

Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 45.

¹⁵² Kistiakowsky, *Scientist at the White House*, 387.

¹⁵³ Dudley Sharp, Memorandum for the Chief of Staff, USAF, September 13, 1960, folder: 4-5 Missiles/Space/Nuclear, box 36, Thomas White papers, LoC, 1-2.

¹⁵⁴ Haines, 19-20. The NRO Historian position was only created in 1995 and this cited draft chapter is the first product of that new office. Numerous secondary sources, however, have discussed the basic facts surrounding the NRO's creation and have pointed out the fact that the NRO sprang from the Office of Missile and Satellite Systems: see Richelson, *Secret Eyes*, 47; David Spires, manuscript copy of chapter 2, "From Eisenhower to Kennedy: The National Space Program and the Air Force's Quest for a Space Mission, 1958-1961," from the forthcoming book on the Air Force in space, 1945-1990, to be published by the Office of Air Force History, 48; R. Cargill Hall, "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security," *Prologue: Quarterly Journal of the National Archives* 27 (Spring 1995): 68; and Stares, *The Militarization of Space*, 46, among many.

to what became known as "TK" information was strictly prohibited from "... imparting any information within this system to any person not specifically known to them to be on the list of those authorized to receive this material."¹⁵⁵ From this point forward, virtually no primary sources concerning the NRO or reconnaissance satellites are available. Therefore, discussions of the NRO (such as those speculating on continued Air Force-CIA managerial tension) and reconnaissance satellites during the Kennedy and Johnson administrations rely almost wholly upon secondary sources.

This chapter has examined the final elements of Eisenhower's space policy: the actual human spaceflight programs of NASA's Mercury and the USAF's Dynasoar; the relationship between these projects, and finally; and the creation of the NRO to supervise and direct the reconnaissance satellite program, which stands as the third institutional wing (after the DoD and NASA) of the American space edifice. Eisenhower clearly blazed the trail that his predecessors would follow in most aspects of the space program. The one glaring exception would of course be Kennedy's approval of Project Apollo. With this, Kennedy would reverse Eisenhower's philosophy of not using human spaceflight as a competitive tool for international prestige. In fact, Kennedy's space policy would highlight beating the Soviets to the moon and back. Nevertheless, in most other areas, Kennedy and Johnson continued in the same general direction that Eisenhower pointed them. Reconnaissance satellites remained paramount and the overall tenor of NASA-DoD relations continued to be characterized by a complex mix of support, coordination, and rivalry. The next chapter will examine in detail the one major change Kennedy did make in Eisenhower's space program and philosophy: emphasizing human spaceflight for prestige purposes and thereby sending America on its way to the moon.

¹⁵⁵ Eisenhower, Memorandum to the Secretaries of State and Defense, the Attorney General, the Chairman of the AEC, and the Director of Central Intelligence, August 26, 1960, reprinted in Kevin C. Ruffner, editor, *CORONA: America's First Satellite Program*, CIA Cold War Records (Washington, DC: Center for the Study of Intelligence, 1995), 75.

6. Kennedy's Philosophy: Prestige and the Manned Lunar Landing Program

I have premised my campaign on the single assumption that the American people are uneasy at the present drift in our national course, that they are disturbed by the relative decline in our vitality and prestige, and that they have the will and strength to start the United States moving again.¹

Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to land on the moon, or by a rocket to go to the moon and back with a man? Is there any other space program which promises dramatic results in which we could win? . . . Are we working 24 hours a day on existing programs? If not, why not?²

If we can get to the moon before the Russians, we should. . . I think we face an extremely serious and intensified struggle with the Communists.³

By the time a manned lunar landing has been accomplished our success may well have a less advantageous impact abroad than we expect.⁴

The idea that we should act so as to maintain or enhance our national pride and that this requires us to beat the Russians in scientific and technological achievement is a new and different motive called up by Sputnik; and that it may go the way of former major objectives is suggested by the late President's proposal of September, 1963, that instead of racing the Russians to the moon we should join with them in a cooperative program.⁵

This chapter will examine three primary points. It will start with a brief look at Kennedy's general approach to the cold war in an attempt to lay the background for how his space policy fit into his

¹ John F. Kennedy, cited by Paul Hammond, *Cold War and Détente in the American Foreign Policy Process Since 1945* (New York: Harcourt Brace Jovanovich, Inc., 1975), 148.

² John F. Kennedy, Memorandum for Vice President Lyndon B. Johnson, April 20, 1961, in John M. Logsdon with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 424.

³ John F. Kennedy, News Conference, April 21, 1961, *Public Papers of the Presidents of the United States, John F. Kennedy, January 20 to December 31, 1961* (Washington, DC: USGPO, 1962), 310, 311.

⁴ Robert F. Packard, Office of International Scientific Affairs, State Department, to the Executive Secretary, National Aeronautics and Space Council, Memorandum, Subject: Presidential Memorandum of April 9, 1963, dated April 24, 1963, SPI document 972, p. 2.

⁵ Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana, IL: University of Illinois Press, 1964), 4.

larger philosophy. The bulk of the chapter will detail his space policy, how it differed from Eisenhower's, and how Kennedy brought the notion of using human spaceflight as a competitive tool for prestige in the cold war to the forefront. Finally, Kennedy's proposals for cooperating with the Soviets in space projects will be analyzed in an attempt to determine if, near the end of his term, he began to turn away from the competitive framework in which he viewed human spaceflight and towards a more détente-oriented, internationalist philosophy.

Historiography of Space, 1960s

An important historiographical point governs the analysis of both the Kennedy and Johnson administrations' space policies. The plethora of primary source documentation available from the Eisenhower administration becomes a relative dearth from the Kennedy and Johnson era. Three interrelated reasons appear to explain this difference. First, Kennedy's decision making process did not feature an extensive and rigidly structured staff system similar to Eisenhower's. The copious documentation created by the NSC and its subsidiary groups, the PSAC panels, and numerous other bodies from the Eisenhower administration declined dramatically during the Kennedy administration. Instead of Eisenhower's military-derived hierarchical staff system, Kennedy appears to have relied more on ad hoc groups and informal consultations to gather the information he needed to reach a conclusion.⁶ One analyst explains that "... Kennedy eschewed broad policy declarations as futile. Instead he approached each issue from an action perspective and organized special interagency task forces to deal with them."⁷ This method of collecting and using information leaves behind a much less distinct paper trail.

Recent Kennedy biographer Richard Reeves explains Kennedy was determined not to be trapped by procedures: "He liked a certain disorder around him, it kept his people off balance, made them try a little harder. He dismantled Eisenhower's military-style national security bureaucracy, beginning with the Operations Coordinating Board [the NSC's OCB]. . . . His use of the National Security Council itself was

⁶ For a fuller explanation, see John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy* (Oxford and New York: Oxford University Press, 1982), 198ff.

⁷ Bernard J. Firestone, *The Quest for Nuclear Stability: John F. Kennedy and the Soviet Union* (Westport, CT: Greenwood Press, 1982), 81.

casual enough that when General Earle Wheeler, the chief action officer of the Joint Chiefs of Staff, was handed National Security Action Memorandum 22 . . . he realized he had never seen numbers 5 to 21." Wheeler commented to his staff, "The lines of control have been cut. But no other lines have been established." Reeves explains Kennedy believed the lines of power should be like spokes of a wheel, all coming and going from him: "He preferred hallway meetings and telephone calls to desk officers." Kennedy was asked early in his administration why he had not convened the NSC. He replied, "These general meetings are a waste of time. Formal meetings of the NSC are not as effective, and it is much more difficult to decide matters involving high national security if there is a wider group present." Kennedy explained he preferred one-on-one meetings or small group gatherings. Reeves concludes, "Short conversations and long hours substituted for organization." Indeed, by April 1961, Kennedy had called only two Cabinet meetings, then stopped them altogether, declaring, "They're a waste of time."⁸

Testimony from administration insiders supports Reeves' conclusions. Elmer Staats was Deputy Director of the BoB from 1958 to 1966 and saw all three administrations in action. He concluded, "President Kennedy did not use the formal machinery to nearly the same degree that President Eisenhower had used this machinery." Staats explained Kennedy abolished the NSC OCB within 6 months (actually, on February 19, 1961) of his inauguration along with other subsidiary NSC bodies. After attending both NSC and Cabinet meetings, Staats could see Kennedy disliked them and that ". . . it was quite clear that he was impatient with them and much more interested in getting on to current matters on his mind. . . . The Cabinet and the National Security Council tended to meet less frequently as time went by. There was no fixed timetable as was the case in the Eisenhower Administration."⁹ Historians of the presidency have generally concurred with this assessment. George Herring explains that McGeorge Bundy as Kennedy's special assistant for national security affairs assembled a small staff of experts and created a situation room in the White House with direct access to DoD, State Department and CIA cable

⁸ Richard Reeves, *President Kennedy: Profile of Power* (New York: Simon & Schuster, 1993), 52-53, 88.

⁹ Oral history interview of Elmer Staats, July 13, 1964, folder: Kennedy Library, box: White House, Presidents, Kennedy, Photographs - Presidential Library, NHDRC, 19-21.

traffic. Bundy knew that "Kennedy preferred ad hoc, informal meetings to Eisenhower's more regular, formal style" and so Bundy organized informal meetings, often on short notice, in the White House and reported Kennedy's decisions verbally back to the appropriate agencies and departments.¹⁰ Kennedy thus used Bundy and his assistants "... as a personal staff rather than an interagency decision-making board."¹¹ Again, this type of policy implementation process often involved fewer official memoranda, letters, and official policy statements for analysis. In the case of Kennedy's lunar landing decision, good documentation does survive concerning the process whereby the decision was made to go to the moon, but the process whereby this decision was implemented over the next several years is more thinly documented.

Charles Neu explains Kennedy felt elaborate structures like the NSC delayed decisions and deprived him of clear choices. By eliminating them he and his advisers could "... develop new programs and compete more vigorously with the Soviet Union." Especially after the Bay of Pigs fiasco Kennedy started the tendency of modern presidents to "... turn their backs on the complexities of large-scale organizations and attempt to govern without coming to grips with the necessity for management and administrative reform." As Kennedy found organizations like the State Department and the NSC unresponsive to his wishes and efforts to change them, he circumvented them through channels such as Bundy's group or dynamic individuals such as Secretary of Defense Robert S. McNamara.¹² Kennedy regarded Eisenhower's volumes of official NSC policy statements on virtually every conceivable national security and foreign policy issue as, in one scholar's assessment, "... represent[ing] such generalized and compromised viewpoints as to be inadequate as statements of strategic concept."¹³ In their absence he tended to use major presidential addresses to provide guidance on national policy, such as his famous May 25, 1961

¹⁰ George C. Herring, "Introduction," to the Guide to the *Lyndon B. Johnson National Security Files, Agency File, 1963 - 1969*, a microfilm project (Bethesda, MD: University Publications of America, 1993), vi.

¹¹ Firestone, 80.

¹² Charles E. Neu, "The Rise of the National Security Bureaucracy," in Louis Galambos, editor, *The New American State: Bureaucracies and Politics since World War II* (Baltimore and London: The Johns Hopkins Press, 1987), 91, 94.

¹³ Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, volume II* (Maxwell AFB, AL: Air University Press, 1989), 135.

speech that included the lunar landing decision. Statements by other key administration officials such as McNamara could also provide informal but nevertheless vital policy guidance.

One of the consequences of Kennedy's aversion (and later, Johnson's) to numerous, long official policy documents is, "There was no comprehensive, presidentially approved statement of national space policy while John Kennedy or Lyndon Johnson were president, as there had been under Eisenhower."¹⁴ In fact, Eisenhower delivered at least five.¹⁵ In summary, "The ad hoc, collegial style preferred by Kennedy generally produced far fewer written descriptions of policy-making deliberations from the NSC and elsewhere than did Eisenhower's more rigid and formalized structures for the NSC and other bodies."¹⁶

The second point relevant to the relative lack of primary source documents from the Kennedy and Johnson administrations is tied closely to the first. Not only did presidential management style not lend itself to the production of such documents, no single figure or body devoted itself during the Kennedy and Johnson administration to taking virtually verbatim notes from every meeting the president attended and later translating those notes into an official memorandum of conference which was then placed in the historical record. During the Eisenhower administration the Office of the Staff Secretary produced hundreds, if not thousands, of such memoranda of conference for virtually every meeting in which the president participated. A brief look at this dissertation's bibliography will reveal the importance of individuals from that office such as Andrew Goodpaster and L.A. Minnich. Bodies such as the NSC and the Cabinet also had individuals that produced detailed records of each meeting. The NSC series at the Eisenhower Library contains almost 500 individual memoranda of separate NSC meetings. The staff of the Kennedy and Johnson Libraries have informed this author there are very few such equivalent extensive records corresponding to those presidents.

¹⁴ John Logsdon, "The Evolution of U.S. Space Policy and Plans," in *Exploring the Unknown: Volume I*, 382. Logsdon also explains that the NASC did draft such a space policy document but "... it never received presidential sanction." Ibid.

¹⁵ NSC 5520, PSAC's "Introduction to Outer Space," the Space Act, NSC 5814/1, NASC's U.S. Policy on Outer Space a.k.a NSC 5918.

¹⁶ Peter L. Hayes, *Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War* (Ph.D. dissertation. Fletcher School of Law and Diplomacy, Tufts University, 1994), 161.

The third and final point relevant to primary sources relates simply to the passage of time. More time has elapsed since the end of the Eisenhower administration and therefore many more documents have been declassified. Declassification is indispensable to the space historian because the space arena, particularly the military space field, tends to be one of the most heavily classified research topics. More raw data is available from the Eisenhower administration simply because the staffs of various archives have had a few more years to sift through, consider, and declassify Eisenhower era documents when compared to the Kennedy and Johnson material from the 1960s (which, as mentioned above, is much less in quantity to begin with).¹⁷ In the end, historical analysis of questions concerning general space policy and the human spaceflight story in particular is not impossible for the Kennedy and Johnson administrations but is, quite frankly, currently based on much less primary source documentation than is a similar analysis of the Eisenhower administration. It appears that only the passage of time and additional declassification authority (such as the April 17, 1995 presidential Executive Order 12958¹⁸) will help rectify this situation.

Kennedy and the Cold War

Kennedy's cold war philosophy shares many characteristics with Eisenhower's. Both men believed containing the Soviet Union was necessary. Both men believed the USSR posed a genuine threat to America. Nonetheless, both men also believed pursuing an active containment strategy did not preclude searching for means to reduce tensions, slow down the arms race, and reach some kind of *détente*. The statements made in previous chapters concerning the Janus-like quality of Eisenhower's cold war outlook are therefore also valid for Kennedy. Elements of the sword and olive branch were not mutually exclusive in the way each man structured his cold war policies. One noted cold war historian explains that Ken-

¹⁷ The author has reached this conclusion after discussions with the declassification officials at not only the three presidential libraries in question but also other facilities such as NARA, LoC, AFHSO and AFHRA. Hayes also encountered the same difficulties in researching space issues at the Kennedy Library; see *ibid*.

¹⁸ E.O. 12958 states that in mid-2000 all classified records more than 25 years old and with "permanent historical value" will be automatically declassified whether or not the records have been reviewed." However, the E.O. also lists nine reasons why agency heads may exempt their records from automatic declassification and, as with any governmental decree, agencies can apply for special waivers from the E.O.'s requirements. See Executive Order 12958, Classified National Security Information, April 17, 1995, p. 11, available from the USGPO.

nedy's world view and the policies flowing from them ". . . differed in no important essential from the Eisenhower policies after 1954. The new Administration was only more efficient and determined in carrying them out."¹⁹

Kennedy's inaugural address, in a not-so-subtle reference to Eisenhower, stated that ". . . the torch has been passed to a new generation of Americans - born in this century." He further declared, "Let every nation know, whether it wishes us well or ill, that we shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe to assure the survival and success of liberty." Kennedy said America must not tempt its adversaries with weakness, "For only when our arms are sufficient beyond doubt can we be certain beyond doubt that they will never be employed." He touched upon the dichotomy of his cold war aims: "Let us never negotiate out of fear. But let us never fear to negotiate." Nevertheless, "In the long history of the world, only a few generations have been granted the role of defending freedom in its hour of maximum danger. I do not shrink from this responsibility - I welcome it."²⁰ Early in his administration Kennedy rarely shrank from the following type of rhetoric: "We are opposed around the world by a monolithic and ruthless conspiracy that relies primarily on covert means for expanding its sphere of influence - on infiltration instead of invasion, on subversion instead of elections, on intimidation instead of free choice, on guerrillas by night instead of armies by day. Its preparations are concealed, not published."²¹ A few days later he characterized communism as a "determined and powerful system [which] will subject us to many tests of nerve and will in the coming years. . . . We will face challenge after challenge, as the communists armed with all the resources and advantage of the police state attempt to shift the balance of power in their direction."²²

¹⁹ Walter LaFeber, *America, Russia, and the Cold War, 1945-1966* (New York: John Wiley & Sons, 1967), 229, as cited by John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass. and London, England: The MIT Press, 1970), 160.

²⁰ Kennedy, Inaugural Address, January 20, 1961, *Public Papers of the President, 1961*, 1-3.

²¹ Kennedy, speech on April 27, 1961, cited in Reeves, 108.

²² Kennedy, Address to the National Association of Broadcasters, May 8, 1961, *Public Papers of the President, 1961*, 368.

In more private settings, Kennedy was not quite as alarmist, but still firm. For instance, he wrote Khrushchev on February 21, 1961 to propose a summit, saying, "You may be sure, Mr. Chairman, that I intend to do everything I can toward developing a more harmonious relationship between our two countries."²³ When he met with Khrushchev in Vienna during the first week of June 1961 Kennedy said that since the two countries were "competing with each other in different parts of the world," the two men had to "... find during his Presidency ways and means of not permitting situations where the two countries would be[come] committed to actions involving their security and endangering peace, to secure which is our basic objective." When Khrushchev stated, "He did not want to conceal that the USSR was challenging the United States; it wants to become richer than the United States. . . ." Kennedy disagreed with this economic motive and said his own interpretation of the situation was "... that the Soviet Union was seeking to eliminate free systems in areas that are associated with us. . . . This is a matter of very serious concern to us." Khrushchev of course denied this and after Kennedy said people and governments must have free choice and that the real problem was "... how to conduct this disagreement in areas where we have interests without direct confrontation of the two countries and thus to serve the interests of our people." As Khrushchev continued to deny any culpability, Kennedy started to become flustered and interjected "... that Mao Tse Tung had said that power was at the end of the rifle." Khrushchev said he did not believe this.²⁴

The two men continued at loggerheads over the Berlin situation, the nuclear test ban question, the crises in Congo and Laos, nuclear disarmament, and the two countries' general relationship during the remainder of the summit, which was their only face-to-face meeting. Their exchanges concluded with Khrushchev exclaiming, "The U.S. wants to humiliate the USSR and this cannot be accepted. He said that he would not shirk his responsibility and would take any action that he is duty bound to take. . . ." Khrushchev continued by stating that if the United States did not sign a peace treaty with East Germany

²³ Cited by Michael R. Beschloss, *The Crisis Years: Kennedy and Khrushchev, 1960-1963* (New York: Harper Collins, 1991), 70.

²⁴ State Department, Memorandum of Conversation, June 3, 1961, Vienna, 12:45 a.m., in the document collection, National Security Archive, *The Berlin Crisis, 1958-1962* (Alexandria, VA: Chadwyck-Healey, Inc., 1991), document 2074, p. 2-5.

ceding control of West Berlin to East Germany, then "... the USSR will have no choice other than to accept the challenge: it must respond and it will respond. The calamities of a war will be shared equally. War will take place only if the U.S. imposes it on the USSR." The State Department record of the summit ends with, "The President concluded the conversation by observing that it would be a cold winter."²⁵ Entire books can, and have, been devoted to Kennedy's overall cold war policy and how it was or was not instantiated in particular crises. The salient points for the space policy discussion are simply that: one, Kennedy was willing to be firm with the Soviet Union and dramatically increase defense spending; two, he did see the United States as engaged in a competitive struggle with the USSR; but, three, he was also willing to negotiate measures to reduce tensions and move toward a détente, though one must guard against overemphasizing this final trend.

Kennedy, the Cold War, and Defense Spending

Throughout 1961 and 1962 a succession of cold war crises plagued the Kennedy administration: the Bay of Pigs; Laos; the Congo; Berlin; and, most serious of all, the Cuban Missile Crisis. With only slight exaggeration, one historian states, "The thousand days of the Kennedy administration resonated with the constant sound of alarm bells."²⁶ The details are not germane to this dissertation's focus but several overarching points are. First Kennedy did not hesitate to significantly increase defense spending as part of the cold war competitive environment. Before the Vienna summit he had already recommended increasing United States defense spending by \$650 million to: augment United States counter guerrilla warfare special forces such as the Green Berets; to increase Polaris ballistic missile submarines from 29 to 19; to double the production of Minuteman ICBMs; and to increase air and ground alert of bombers.²⁷ After Vienna he requested (and Congress appropriated) an additional \$3.24 billion for defense; this in-

²⁵ State Department, Memorandum of Conversation, June 4, 1961, Vienna, 3:15 p.m., in *ibid.*, document 2077, p. 1-3.

²⁶ Diane B. Kunz, "Introduction: The Crucial Decade," in Kunz, editor, *The Diplomacy of the Crucial Decade: American Foreign Relations During the 1960s* (New York: Columbia University Press, 1994), 3.

²⁷ Kennedy, Special Message to the Congress on the Defense Budget, March 28, 1961, *Public Papers of the President, 1961*, 230-35.

creased the Army from 875,000 to a million, increased the Navy by 29,000 and the Air Force by 63,000, doubled draft calls and call-ups of reservists.²⁸ During his first six months in office, Kennedy increased Eisenhower's defense budget by \$6 billion total, to \$47.5 billion.²⁹ Further increases meant that in January 1962 Kennedy requested a \$51.6 billion dollar defense budget for FY63 (the total federal budget that year was \$92.5 billion).³⁰

Theodore Sorensen was one of Kennedy's closest personal advisers and he recalled, "Kennedy believed in arming the United States to provide bargaining power and backing for disarmament talks and diplomacy." Kennedy's basic instruction on defense spending was, "Under no circumstances should we allow a predetermined arbitrary financial limit to establish either strategy or force levels." Sorensen says in his three years Kennedy conducted "... the largest and swiftest [defense] build-up in this country's peacetime history, at a cost of some \$17 billion in additional appropriations" which provided the United States with a versatile arsenal "... ranging from the most massive deterrents to the most subtle influences."³¹ McNamara concurred: "I would say that a major instruction which I received from President Kennedy was to develop a defense program that would assure the security of our Nation without regard to arbitrary budget ceilings."³² Therefore, it seems unlikely that Kennedy would balk at significantly boosting space spending due to financial concerns if he believed an accelerated space program would somehow

²⁸ Kennedy, Radio and Television Report to the American People on the Berlin Crisis, July 25, 1961, *ibid.*, 534-5.

²⁹ Reeves, 201. Kennedy boasted at an October 11, 1961 News Conference that this \$6 billion dollar, 14% increase over Eisenhower's defense budget had increased: the number of Polaris submarines by 50%; the number of bombers on 15-minute strategic alert by 50%; the production capacity for Minuteman missiles by 100%; airlift capacity by 75%; anti-guerrilla forces by 150%; and production of M-14 infantry rifles from 9,000 to 14,000 per month. See *Public Papers of the President, 1961*, 658. Kennedy, Johnson, and McNamara, in various settings and throughout the course of Kennedy's administration, would frequently use these figures and others for similar increases in tactical aircraft procurement, active duty Army divisions, aircraft carriers, civil defense, and many other measurements of the vast increases in spending for nuclear and conventional forces. An interesting footnote, however, is that due to the rapid economic growth during Kennedy's administration, defense spending as a percentage of GNP actually declined from 9.1% to 8.5%. See Gaddis, 226.

³⁰ Larry Booda, "Kennedy Asks \$51.6 Billion for Defense," *Aviation Week and Space Technology* (January 22, 1962): 26.

³¹ Theodore C. Sorensen, *Kennedy* (New York: Harper & Row, Publishers, 1965), 602, 608-09.

³² Cited by Futrell, *volume II*, 23.

contribute to America's overall well-being and to the United States' cold war struggle with the Soviet Union. Such was the case with Project Apollo.

Kennedy and Competing with the Soviets

The second point from Kennedy's cold war approach relevant to space policy is that in general he seems to have had no aversion to competing with the Soviets. After the Soviets broke the voluntary United States-USSR-Great Britain moratorium observed since November 1958 and resumed testing nuclear weapons in the atmosphere on August 31, 1961, Bundy recorded, "The President's patience is at an end." Bundy added that Kennedy said, "The world is being subjected to threats and terror. We have to show both our friends and our own people that we are ready to meet our own needs in the face of these new Soviet acts."³³ Part of this competitive dynamic involved Kennedy making it absolutely clear to Khrushchev that Kennedy knew the American nuclear arsenal was superior to the Soviet Union's,³⁴ that Khrushchev should not press his demands on issues like Berlin too far, and that America would prefer peaceful competition in areas like space instead of an escalating arms race.

The chosen vehicle for communicating this competitive resolve to Khrushchev was a speech on October 21, 1961 by Deputy Secretary of Defense Roswell Gilpatric to the National Business Council. Reeves states, "Kennedy appointed himself Gilpatric's editor, going through the text line by line and number by number."³⁵ Gilpatric later concurred that the speech was coordinated ". . . all the way up to

³³ State Department, Memorandum of Conversation Between Secretary of State Rusk and the President's Special Assistant for National Security Affairs [M. Bundy], September 5, 1961, reprinted in David Mabon and David Patterson, editors, *Foreign Relations of the United States, 1961-1963, Volume VII: Arms Control and Disarmament* (Washington, DC: USGPO, 1995), 163.

³⁴ The reader will remember that by late 1960 American reconnaissance satellites were regularly returning imagery from the Soviet Union. Early in Kennedy's administration high officials from the president on down were convinced by this imagery that the so-called "missile gap," an important issue in the just-completed election campaign, did not in fact imperil America. The only missile gap that did exist was actually in reverse: America's strategic superiority was so vast that the USSR was actually the victim of a missile gap when comparing its strategic capabilities to America's. The best one-volume treatment of the complex history of the missile gap is Edgar M. Bottome, *The Missile Gap: A Study of the Formulation of Military and Political Policy* (Rutherford, NJ: Farleigh Dickenson University Press, 1971). At the time of the Cuban missile crisis, the United States had over 5,000 deliverable nuclear weapons while the Soviets had approximately 300. See Reeves, 375.

³⁵ Reeves, 246.

and including the president.”³⁶ The tone of the speech clearly seems to have been intended to impress upon the Soviets that the United States was ready, willing, and able to compete:

The total number of our nuclear delivery vehicles . . . is in the tens of thousands, and, of course, we have more than one warhead for each vehicle. . . . Our forces are so deployed and protected that a sneak attack could not effectively disarm us. The destructive power which the United States could bring to bear even after a Soviet surprise attack upon our forces would be as great as, perhaps greater than, the total undamaged force which the enemy can threaten to launch against the United States in a first strike. In short, we have a second-strike capability which is at least as extensive as what the Soviets can deliver by striking first.³⁷

This speech, as one cold war historian summarized, marked the “final expression of Kennedy’s determination to overturn his predecessor’s method of dealing with the Soviet Union.”³⁸ Kennedy would not refrain from competing against the Soviets in their chosen field, be it nuclear arms or space. Kennedy would not shrink from pointing out America’s areas of superiority and those areas in which America needed to catch up. A race to the moon would be one competitive mode which Kennedy embraced and the one directly relevant to this dissertation. As Kennedy commented in his first State of the Union message, America did not want to compete militarily with the USSR if it had a choice. However, “Open and peaceful competition - for prestige, for markets, for scientific achievement, even for men’s minds - is something else again. For if Freedom and Communism were to compete for man’s allegiance in a world at peace, I would look to the future with ever increasing confidence.”³⁹

Thawing?

The third Kennedy cold war principle relevant to space policy is that after the brinkmanship of the Cuban missile crisis in October 1962 forced Kennedy and Khrushchev to directly face the possibility of nuclear war, there was some movement toward détente. One scholar says that while the missile crisis

³⁶ Oral history interview of Roswell Gilpatric, June 30, 1970, from *The John F. Kennedy Presidential Oral History Collection, Part I: The White House and Executive Departments*, microfilmed from the holdings of the John F. Kennedy Library (Frederick, MD: University Publications of America, 1988), reel 5, p. 71.

³⁷ Cited by Beschloss, 330.

³⁸ Beschloss, 350.

³⁹ Kennedy, State of the Union message, January 30, 1961, *Public Papers of the President, 1961*, 23.

did not mark the end of the cold war. it "... signified the end of that acute phase of Soviet pressure and attempted blackmail" that so distressed Kennedy.⁴⁰ At a minimum, Kennedy incorporated conciliatory language into his speeches. John Lewis Gaddis explains that while Kennedy made no significant alteration of his earlier policy of seeking agreement on negotiable issues while taking care not to convey any sense of weakness to the Soviets, it was Khrushchev who made most of the obvious movement toward détente because he "... now abandoned his obviously counterproductive strategy of seeking to bully the West into an easing of antagonisms."⁴¹ Whoever moved and how much is not the issue. There appeared to be a greater willingness to tone down the rhetoric and take concrete actions to lessen tensions. As Kennedy said after the missile crisis, "... the achievement of a peaceful solution to the Cuban crisis might well open the door to the solution of other outstanding problems."⁴² One must not stretch the reconciliation point too far, however. As Kennedy said in January 1963, "Here hope must be tempered with caution I foresee no spectacular reversal in Communist methods or goals." Kennedy foresaw a continuously rising defense budget because "... there is no substitute for an adequate defense, and no 'bargain basement' way of achieving it." Nevertheless, "We do not dismiss disarmament as merely an idle dream. For we believe that, in the end, it is the only way to assure the security of all without impairing the interests of any. . . . In short, let our adversaries choose. If they choose peaceful competition, they shall have it."⁴³

The most famous example cited for a sense of budding rapprochement was Kennedy's American University speech of June 10, 1963. One biographer reports Kennedy ordered the speech's drafts kept away from the State and DoD officials who normally coordinated on presidential foreign policy and national security addresses. It so impressed the Soviets that *Izvestia* reprinted it in full and the Soviets

⁴⁰ Adam Ulam, *The Rivals: America & Russia Since World War II* (New York: Penguin Books, 1971), 337.

⁴¹ John Lewis Gaddis, *Russia, the Soviet Union, and the United States: An Interpretive History* (New York: John Wiley and Sons, Inc., 1978), 242.

⁴² Kennedy, News Conference, November 20, 1962, *Public Papers of the President, 1962* (Washington, DC: USGPO, 1963), 831.

⁴³ Kennedy, State of the Union Address, January 14, 1963, *Public Papers of the President, 1963* (Washington, DC: USGPO, 1964), 17-18.

turned off the thousands of transmitters normally jamming signals from the Voice of America so it could be heard in Eastern Europe and the USSR.⁴⁴ In it Kennedy said, "Total war makes no sense in an age when great powers can maintain large and relatively invulnerable nuclear forces and refuse to surrender without resort to those forces." Therefore, peace was "... the necessary rational end of rational men. ... we have no more urgent task." While Kennedy said he hoped Soviet leaders would "adopt a more enlightened attitude" toward the pursuit of peace, he added, "I believe we can help them do it." He warned Americans against falling into the same trap of the Soviet leaders in which they actually start to believe the propaganda they write about Americans. Kennedy emphasized, "No government or social system is so evil that its people must be considered as lacking in virtue. As Americans, we find communism profoundly repugnant as a negation of personal freedom and dignity. But we can still hail the Russian people for their many achievements." Kennedy pointed out that the hard reality was that both sides "... have a mutually deep interest in a just and genuine peace and in halting the arms race." Therefore,

Let us not be blind to our differences, but let us also direct attention to our common interests and to the means by which those differences can be resolved. ... in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's future. And we are all mortal. Let us reexamine our attitude toward the cold war remembering that we are not engaged in a debate, seeking to pile up debating points. ... We must deal with the world as it is. ... We must, therefore, persevere in the search for peace in the hope that constructive changes within the Communist bloc might bring within reach solutions which now seem beyond us. We must conduct our affairs in such a way that it becomes in the Communists' interest to agree on a genuine peace.

But even among these words of conciliation, the competitive dynamic was not far from Kennedy's mind. He also stated in the American University speech, "We are unwilling to impose our system on any unwilling people - but we are willing and able to engage in a peaceful competition with any people on earth." Too much can also be made of the spirit of détente in this speech; one Kennedy insider says its effect "... was to redefine the whole national attitude toward the cold war."⁴⁵ Historians often ignore the address' closing section in which Kennedy emphasized, "The Communist drive to impose their political and economic system on others is the primary cause of world tension today. For there can be no doubt

⁴⁴ Reeves, 507, 514.

⁴⁵ Arthur M. Schlesinger, Jr., *A Thousand Days: John F. Kennedy In the White House* (Boston: Houghton Mifflin Company, 1965), 900.

that, if all nations could refrain from interfering in the self-determination of others, the peace would be much more assured."⁴⁶ Nevertheless, it is difficult to find such words of conciliation in Kennedy's rhetoric before the Cuban missile crisis. One perceptive commentator explains that after the Cuban missile crisis, "The change was not in Kennedy but in what he perceived to be his political environment."⁴⁷ Whatever its origins, this very nascent détente is relevant to space history because it is in this context at the end of his term that Kennedy suggested the lunar landing program could be made a joint United States-Soviet effort. This in turn undermined the competitive, prestige-oriented dynamic in the minds of many, including some in Congress.

Kennedy, Space Policy, and Prestige

Having sketched the aspects of Kennedy's cold war orientation that were applicable to his space policy, the next logical question is exactly what was Kennedy's space policy. The answer forms the heart of this chapter and is an important determinant of the NASA-DoD relationship in human spaceflight. Before he became president, and perhaps even during the first few weeks of his administration, Kennedy appears not to have devoted any great effort to contemplating space policy. During the 1960 presidential campaign it was an issue which helped him support his general theme that America was somehow trailing the USSR and required a new leader that would get the country back on its feet and moving again. Before the campaign Kennedy viewed space as an issue only inasmuch as it supported his assertions that Eisenhower and Nixon had permitted the United States to fall behind the USSR military and that a dangerous missile gap was opening.

Pre-Presidential Attitudes and Statements

For instance, a month after Sputnik he said the United States was losing the satellite-missile race with the USSR because of "... complacent miscalculations, penny-pinching, budget cutbacks, incredibly confused mismanagements and wasteful rivalries and jealousies." Kennedy called for Eisenhower to "...

⁴⁶ Kennedy, Commencement Address at American University, June 10, 1963, *Public Papers of the President, 1963*, pp. 460-63.

⁴⁷ Beschloss, 600.

tell us exactly where we stand today and where we go from here. The people of America are no longer willing to be lulled by paternalistic reassurances, spoon-fed science fiction predictions or by pious platitudes of faith and hope."⁴⁸ Similarly, on January 12, 1958 Kennedy claimed

Tonight the national interest is in perhaps greater peril than it has been at any time in the 20th century. We face the prospects of being relegated to the status of a second-class power. We live for the first time on what may be the front lines in an international war, on the bull's eye of Soviet missile targets. We face the prospects of Communist control of outer space and the weather, with all the terrible consequences that would have for life on this continent. . . . We face a future which may well bring devastating attacks against which we have no real defense, the loss of our bargaining power at the international conference table, the loss of our peace, our peace of mind, and our way of life.

Kennedy then called for the development and deployment of "new missiles and weapons, nuclear-powered aircraft and space vehicles."⁴⁹

This speech is representative of his linkage of space concerns, the missile gap, and national security throughout the post-Sputnik period and his presidential campaign. Perhaps most well-known was his missile gap speech delivered on the Senate floor on August 14, 1958. His campaign later reprinted this speech in booklet form for widespread distribution. In it he claimed the United States was ". . . about to lose the power foundation that has long stood behind our basic military and diplomatic strategy" because in the past, "We have possessed a capacity for retaliation so great as to deter any potential aggressor from launching a direct attack upon us. . . . The hard facts of the matter are that this premise will soon no longer be correct." He explained the United States was ". . . rapidly approaching that dangerous period called the 'gap' or the 'missile lag' period, which is . . . a period in which our own offensive and defensive missile capabilities will lag so far behind those of the Soviets as to place us in a position of great peril. . . . the deterrent ratio might well shift to the Soviets so heavily, during the years of the gap, as to

⁴⁸ Kennedy, Address to the District Democratic Meeting in Topeka, Kansas, November 7, 1957, from Susan Miller, compiler, *Statements of John F. Kennedy on Space Exploration, 1952-1963*, NASA HHN-26, 1964, NHDRC, 1957 section, no page numbers used.

⁴⁹ Kennedy, speech to the Knights of Columbus, Boston, MA, January 12, 1958, in Paul L. Kesaris, editor, *Presidential Campaigns: The John F. Kennedy Campaign, Part II: Speeches, Press Conferences, and Debates*, a microfilm collection from the holdings of the John F. Kennedy Library, part of the series *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenburg, General Editor (Frederick, MD: University Publications of America, Inc., 1986), reel 4, pp. 1-2, 4.

open to them a new shortcut to world domination." Kennedy claimed their "sputnik diplomacy" was an example of this process through which "the periphery of the free world will slowly be nibbled away."

Kennedy blamed the Eisenhower administration for this turn of events because the missile and space gap was "... but another symptom of our national complacency, our willingness to confuse the facts as they were with what we hoped they would be. . . . our willingness to place fiscal security ahead of national security."⁵⁰ Kennedy's usual suggestions for remedies included vastly increased spending on missiles and nuclear aircraft. When space was mentioned, Kennedy placed it in the national security context. In a February 1960 speech he said the Soviet satellites meant that "for the first time since the War of 1812, foreign enemy forces potentially had become a direct and unmistakable threat to the continental United States, to our homes and to our people. . . . But only belatedly were sufficient time and attention given to our missile program. And even then sufficient funds were not forthcoming." Kennedy concluded it was easier to gamble with survival, "But I would prefer that we gamble with our money - that we increase our defense budget this year - even though we have no absolute knowledge that we shall ever need it. . . . That is the harder alternative."⁵¹

On those occasions in which Kennedy, Johnson, or the Democratic Party did specifically address space issues, their concerns were linked with either the United States-USSR competitive dynamic or with the missile gap. Johnson simply declared, "We cannot concede outer space to communism and hold leadership on earth." The Democratic platform for 1960 said

The Republican Administration has remained incredibly blind to the prospects of space exploration. It has failed to pursue space programs with a sense of urgency at all close to their importance to the future of the world. It has allowed the Communists to hit the moon first, and to launch substantially greater payloads. . . . The new Democratic Administration will press forward with our national space program in full realization of the importance of space accomplishments to our national security *and our international prestige*. We shall reorganize the program to achieve both efficiency and

⁵⁰ Kennedy, remarks in the Senate, August 14, 1958, from *ibid.*, reel 11.

⁵¹ Kennedy, Senate speech on American defense policy, February 29, 1960, in Robert L. Branyan and Lawrence H. Larsen, editors/compilers, *The Eisenhower Administration, 1953-1961: A Documentary History*, volume two (New York: Random House, Inc., 1971), 1228, 1231. The editors include representative samples of Kennedy's numerous missile gap speeches in their Eisenhower volumes as examples of Eisenhower's opponents' use of the "missile gap" as a political issue.

speedy execution.⁵²

Kennedy told a VFW convention in August 1960

The world's first satellite was called a Sputnik, not Vanguard or Explorer. The first living creatures to orbit the earth were Strelka and Belka, not Rover and Fido. Now let me make it clear that I believe there can be only one defense policy for the United States, and that this is summed up in the word 'first.' I do not mean 'first, but.' I do not mean 'first, when.' I do not mean 'first, if.' I mean first period.⁵³

Sorensen recalls that while Kennedy's opponent, Vice President Richard Nixon, would often highlight how he shook his finger in Khrushchev's face during their 'kitchen debate' and proclaimed, "You may be ahead of us in rocket thrust but we are ahead of you in color television." Kennedy responded, "I will take my television in black and white. I want to be ahead in rocket thrust."⁵⁴ In another stump speech he concluded, "I want to be known as the President at the end of four years who not only held back the Communist tide but who also advanced the cause of freedom and rebuilt American prestige."⁵⁵

For Kennedy being first, in space or elsewhere was part of what he perceived as a contest for the "hearts and minds" of people worldwide, particularly the developing nations. As he stated in a September 1960 campaign speech,

The hard, tough question for the next decade is whether we or the Communist world can best demonstrate the vitality of our system. Which system, the Communist system or the system of freedom is going to be able to convince the watching millions in Latin America and Africa and Asia, who stand today on the razor edge of decision and try to make a determination as to which direction the world is moving. I think it should move to us. I think ours is the best system. I do not agree with Mr. Khrushchev when he says he is going to bury us. I think we can demonstrate in the next ten years, in the next 40

⁵² Both Johnson citation from December 18, 1959 and platform extract from R.E. Lapp, Frank McClure, Trevor Gardner, Position Paper on Space Research, August 31, 1960, in Paul L. Kesaris, *Presidential Campaigns: The John F. Kennedy 1960 Campaign, Part I: Polls, Issues, and Strategy*, a microfilm collection from the holdings of the John F. Kennedy Library, part of the series *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenburg, General Editor (Frederick, MD: University Publications of America, Inc., 1986), reel 4, pp. 7-8. Emphasis added.

⁵³ Miller, *Statements of John F. Kennedy on Space Exploration*, *supra*, 1960 section. In other iterations of this speech Kennedy added that the first country to place its national emblem on the moon was Russia, not America.

⁵⁴ Sorensen, 182-83.

⁵⁵ Cited by Reeves, 54.

years, that our high noon is in the future, that our best days are ahead. . .⁵⁶

A standard theme in most Kennedy campaign speeches was: "American prestige, essential to our influence and security, has declined these last eight years even more sharply than we realized. . . . I do not say that the balance of power is determined by a popularity contest. But I do say that our prestige affects our ability to influence these nations, to strengthen the forces of freedom within them, to convince them of which way lies peace and security. . . . If we are to save the peace and rebuild our security, we must remold the symbol of Uncle Sam as the forceful spokesman of a great and generous nation."⁵⁷ A report from Johnson's staff (in late October 1960, after Kennedy and Johnson were on the same ticket and were therefore no longer overt rivals) concluded, "It is hardly an overestimate to say that space has become for many people the primary symbol of world leadership in all areas of science and technology. . . . Our space program may be considered as a measure of our vitality and ability to compete with a formidable rival, and as a criterion of our ability to maintain technological eminence worthy of emulation by other peoples."⁵⁸

Kennedy's most pointed attack on Eisenhower's space policy during the 1960 campaign came in an article published under his name⁵⁹ for the aerospace trade magazine *Missiles and Rockets*. In it he declared, "We are in a strategic space race with the Russians, and we have been losing. . . . Control of space will be decided in the next decade. If the Soviets control space they can control earth. . . ." Therefore, the United States ". . . cannot run second in this vital race. To ensure peace and freedom, we must

⁵⁶ Kennedy, speech in Salem, OR, September 7, 1960, in Kesaris, ed., *Part II*, reel 8, p. 2.

⁵⁷ Kennedy speech in Elmhurst, IL, October 25, 1960, in Kesaris, ed., *Part II*, reel 10, p. 1, 3. This particular speech lamenting America's loss of prestige was released by the Democratic Party as News Release B-2783.

⁵⁸ Max Lehrer, Senate staffer to Lyndon Johnson, Memorandum to Johnson, *The Record on Space*, October 31, 1960, SPI document 498, p. 6.

⁵⁹ Actually, Edward C. Welsh, who would soon be named Kennedy's Executive Secretary for the National Aeronautics and Space Council, explained, "I was asked and did prepare some materials for speeches and articles on both defense and space for nominee Kennedy." One such article he said he wrote for Kennedy was the October 10, 1960 *Missiles and Rockets* piece. See oral history interview with Dr. Edward C. Welsh, February 20, 1969, folder: LBJ Speeches, Press Conferences (1968), box: White House, Presidents, Johnson, Chronological, Press Conferences, NHDRC, 2, 25. This practice is, of course, not unusual for politicians in general.

be first." Kennedy nodded towards civilian space pursuits by saying that goals like space laboratories and Americans on the moon were possible, though their target dates "should be elastic. All these things and more we should accomplish as swiftly as possible. This is the new age of exploration; space is our great New Frontier." He may also have given encouragement to those within the Air Force who concluded the USAF's space role would increase under Kennedy: "The United States must have pre-eminence in security as an umbrella under which we can explore and develop space for the benefit of all mankind. Reorganization of the cumbersome, antique and creaking machinery of the Department of Defense is high on the agenda of the new Democratic administration." Even in this article designed to specifically address space issues, Kennedy presented in detail his plan for augmenting defense spending, increasing the number of strategic missiles, and expanding and modernizing conventional forces.⁶⁰

While this article was indeed "full of the clash and clamor of the space race" Logsdon points out it is uncertain if it actually represented Kennedy's thinking, given the fact that it stands "... in rather direct contrast to some more cautious statements on the space program made soon after his inauguration."⁶¹ Nevertheless, if nothing else, it demonstrates Kennedy's willingness to use space and missile concerns as a political issue in the 1960 campaign. Summarized one scholar, "Kennedy was successful in magnifying the salience of the space issue and in linking the issue to his overall 'New Frontier' theme."⁶²

Two problems arise with Kennedy's use of the missile gap (with space matters linked to it) issue during the period before the 1960 election. First, as discussed above, "the problem was that there was no missile gap." Eisenhower knew from U-2 and particularly from early reconnaissance satellite information that the United States was firmly in the lead in ICBM production. In fact, Eisenhower administration officials briefed Kennedy and Johnson but they "persisted in exploiting the issue. . . with cartoonish sim-

⁶⁰ John F. Kennedy, "If the Soviets Control Space, They Can Control Earth," *Missiles and Rockets* (October 10, 1960): 12-13.

⁶¹ Logsdon, *Decision to Go to the Moon*, 65. "Clash and clamor" is Logsdon citing Edwin Diamond, *The Rise and Fall of the Space Age* (Garden City, NY: Doubleday & Company, Inc., 1964), 31.

⁶² Stephen P. Depoe, "Space and the 1960 Presidential Campaign: Kennedy, Nixon, and 'Public Time,'" *Western Journal of Speech Communication* 55 (Spring 1991): 227.

plicity.”⁶³ CIA Director Allen Dulles reported to Eisenhower on August 3, 1960, that in accordance with Eisenhower’s instructions he had briefed both Kennedy and Johnson for over two hours on among other issues, “an analysis of Soviet strategic attack capabilities in missiles and long-range bombers and of Soviet nuclear testing prior to the moratorium.”⁶⁴ Yet, the accusations of a missile gap continued to fly.

Second, there are questions concerning whether Kennedy actually believed America’s supposed lagging in space exploration was an important issue (although he may have been genuinely concerned with the missile questions, at least until briefed by the Eisenhower administration). An interviewer asked Kennedy in the spring of 1960 if he favored combining the civil and military space development programs under an overall commissioner, similar to the AEC arrangement. He replied, “Both civilian and military agencies can make a contribution to the development of space technology. We must not be bemused by neatly drawn organizational charts. . . . Nor do I believe that a Manhattan-type project is necessary.” He added that combining the military and civilian programs “will inevitably dilute the fundamental responsibility of the Department of Defense for this country’s military security. I do not believe that any such dilution is either wise or necessary.”⁶⁵ In addition, Kennedy never defined exactly what he had in mind for the American space program. He was silent on the specific changes he would make, never elaborating beyond charging the Eisenhower administration with fiscal neglect of the program and linking the program to a missile gap.

Finally, others recall Kennedy displaying a distinct lack of interest in the space program when not campaigning or making speeches in the Senate. Charles Stark Draper was Director of MIT’s Instrumentation Lab and often briefed, both formally and informally, Kennedy on science, technology, and

⁶³ Beschloss, 25-27.

⁶⁴ Allen Dulles, Memorandum for the President, August 3, 1960, folder: Allen Dulles (1), box 13, Administration series, Ann Whitman file, DDEL, 1.

⁶⁵ Kennedy in *Ground Support Equipment* magazine, April-May 1960, as cited in NASA monograph *Selected Statements of President Kennedy on Defense Topics, December 1957 - August 1, 1962*, August 15, 1962, folder: Kennedy - Statements on Defense, box: White House, Presidents, Kennedy, Defense Statements, NHDRC, 201. The latter portion is another example of the kind of Kennedy statements that may have given the Air Force the idea he was amenable to a larger military role in space.

R&D issues. Draper recalled meeting Kennedy and his brother Robert at a restaurant-bar in Boston after Sputnik but before the 1960 election and watching the maitre d' hang soda straws by a cross pin, light one end and insert it into a bottle, and watch them pop to the ceiling. "Rather heated argument" ensued between the Kennedys and Draper over the usefulness of rockets. Draper said John Kennedy "... could not be convinced that all rockets were not a waste of money, and space navigation even worse."⁶⁶ Kennedy's science adviser Jerome Wiesner said concerning the space program before Kennedy came to office. "He hadn't thought much about it." As one Apollo history concludes, "Certainly Jack Kennedy the senator hadn't been interested in space. . . . he really wasn't convinced that manned space flight had a place in his vision of the New Frontier." As he took office, human spaceflight was not "on the agenda at all."⁶⁷

After the Election

Ambiguity, conflict, and uncertainty concerning American space policy and the role of human spaceflight within it characterized the Eisenhower-Kennedy interregnum and early 1961 because, "For the first few months of his administration, Kennedy did not actively involve himself in space policy. . . ."⁶⁸ However, by May 25, and probably several weeks earlier, Kennedy had decided to send America to the moon and back in quest of cold war prestige. What conditions changed and why did Kennedy make this decision? The historian need go no further in answering these questions than Logsdon's *Decision to Go to the Moon*. This now-classic treatment details every facet of Kennedy's decision and its ultimate impact. This dissertation does not pretend to offer new insights beyond Logsdon's theses but will attempt to summarize the important developments and to highlight the role of the DoD in the process.

A few days after the election presidential transition team member Walt Rostow wrote Kennedy to raise the kind of space-related questions he believed Kennedy's administration would need to address. The fact that these questions still required resolution illustrates the indeterminate nature of Kennedy's space thinking at that time. Rostow said the key issues requiring resolution included: "Should we stick

⁶⁶ Oral history interview of C.S. Draper, June 2, 1974, folder: Kennedy - Pre-White House, box: White House, Presidents, Kennedy, Kennedy Library materials, interviews through 1960, NHDRC, 1.

⁶⁷ Wiesner cited in, and conclusions from, Charles Murray and Catherine Bly Cox, *Apollo: The Race to the Moon* (New York: Simon and Schuster, 1989), 60-61.

⁶⁸ Logsdon, *Decision to Go to the Moon*, 64.

with NASA and a continued split between scientific and military space programs; or should we go for a space AEC?. . . What should be the objective of the scientific space program? In light of these objectives, is [the] present program big enough? Too big? Shall we proceed with Project Mercury? If so, at what pace and with what objectives?. . . How and when should we internationalize the scientific space efforts with other nations of the Free World? With the Russians?"⁶⁹ Kistiakowsky recalls that after Eisenhower was briefed on and rejected Project Apollo and the PSAC's Hornig's Ad Hoc Panel on Man-in-Space report late in December, Kennedy was also given the panel's report ". . . and had then a negative reaction to the moon-landing proposition"⁷⁰ and even that Kennedy said, "Project Apollo was for the birds."⁷¹ One prescient presidential adviser early on stated that the heart of the space problem facing Kennedy was the question of "pressing achievement for the sake of psychological effect, regardless of concrete scientific or military utility." This official even foresaw Lyndon Johnson's eventual role when he wrote Kennedy, "You wanted something you could give him to work on and worry about. I hope this meets the purpose." "This" being the interrelated complex of questions concerning: Should the United States get out of the space for prestige race and focus on space applications which have tangible value? Or should the United States press the space for prestige angle? If so, what particular "firsts" were most appealing and dramatic?⁷²

⁶⁹ Walt W. Rostow, memorandum for Kennedy, November 7, 1960, Paul Kesaris and Robert Lester, Project Coordinators, *President John F. Kennedy's Office Files, 1961-1963, Part 1: Special Correspondence, Speeches, Legislative, and Press Conference Files*, in *Research Collections in American Politics, Microforms from Major Archival and Manuscript Collections*, William Leuchtenberg, General Editor (Frederick, MD: University Publications of America, 1989), reel 5, no page numbers given.

⁷⁰ George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology* (Cambridge, MA and London: Harvard University Press, 1976), 409.

⁷¹ Kistiakowsky, oral history interview of, May 22, 1974, file: Kistiakowsky, box: Emme/Roland interviews on early NASA history, shelf: V-A-1, NHDRC, 38.

⁷² Richard E. Neustadt, Memorandum for Senator Kennedy, Subject: Space Problems for you to use with Lyndon Johnson, December 20, 1960, *Exploring the Unknown, Volume I*, 413-14; and cover letter dated December 23, 1960, containing the reference to Lyndon Johnson, SPI document 1178, p. 1. It should be noted that one of the few space-related actions Kennedy did take early on was to have Welsh draft and to sign an amendment to the Space Act on April 25, 1961 that made the Vice President, instead of the President, chairman of the NASC. Johnson then assumed an important role in the long and difficult task of finding someone willing to serve as NASA Administrator in an environment of uncertainty

The most often discussed early Kennedy administration space document is the report from a group headed by another MIT professor and Kennedy confidant Jerome Wiesner. Wiesner would serve as Kennedy's science adviser. One of his responsibilities during the transition period was to examine America's space program and make recommendations to the president-elect. The Wiesner Committee's "Report to the President-Elect of the Ad Hoc Committee on Space" of January 10, 1961 has been characterized as "hastily prepared" and offering Kennedy "no new options," but if nothing else it "did make explicit the beliefs of many influential scientists."⁷³

Wiesner began by emphasizing that ICBMs were "the most important of all space programs" and that "for the near future the achievement of an adequate deterrent force is much more important for the nation's security than are most of the space objectives," but that there were five other motivations for a vital, effective space program. First was prestige because, "During the next few years the prestige of the United States will in part be determined by the leadership we demonstrate in space activities." The report also cited national security, scientific observation and experimentation, practical non-military applications, and possibilities for international cooperation. Most of the rest of the report was devoted to explaining what it felt were the "serious problems within NASA, within the military establishment and at the executive and other policy-making levels of government."⁷⁴ The Wiesner report charged that in addition to the lack of large capacity space launch vehicles, one of the major handicaps for the American space program "... has been the lack of a strong scientific personality in the top echelons of its organization. ... There is an urgent need to establish more effective management and coordination of the United States space effort. ... Neither NASA as presently operated nor the fractionated military space program nor the long dormant space council have been adequate to meet the challenge that the Soviet thrust into space has posed to our military security and to our position of leadership in the world." The report added, "...

and ambiguity. In April and May Johnson would spearhead the effort that recommended a lunar landing and return as the best way to beat the Soviets in space.

⁷³ Arnold S. Levine, *Managing NASA in the Apollo Era*, (Washington, DC: USGPO, 1982), 17.

⁷⁴ Jerome Wiesner et. al., Report to the President-Elect of the Ad Hoc Committee on Space, January 10, 1961, SPI document 1238, pp. 1-4. Some, but not all, of the Wiesner Report, is reprinted in *Exploring the Unknown, Volume I*, 416-423.

many inexperienced people have been placed in positions of major responsibility.”⁷⁵ This was a stinging criticism of the at least some level of NASA’s leadership as well as the overall structure of the space program.

While the report left open the possibility that human spaceflight could be justified by the prestige motive it concluded, “A crash program aimed at placing a man into an orbit at the earliest possible time cannot be justified solely on scientific or technical grounds.” Further, Mercury had to be carefully evaluated because of the problems in its test launch program and whatever was decided about human spaceflight, “we should stop advertising MERCURY as our major objective in space activities. . . . It exaggerates the value of that aspect of space activity where we are less likely to achieve success, and discounts those aspects in which we have already achieved great success. . . . Indeed we should make an effort to diminish the significance of this program to its proper proportion before the public, both at home and abroad.”⁷⁶ The Wiesner report was most certainly *not* a ringing endorsement for either the current American human spaceflight effort or the idea of competing with the USSR for prestige in space.

Throughout January 1961, the mood within NASA continued to be uncertain due to the critical nature of the Wiesner report, which Dryden claimed “. . . was the only knowledge which President Kennedy on coming into office had about the NASA space program,”⁷⁷ and due to the fact that Glennan had resigned and left town but there was no contact with the Kennedy administration until it finally nominated a new NASA Administrator on January 31, James E. Webb.⁷⁸ Glennan commented, “To my surprise, not

⁷⁵ Ibid. to SPI document 1238, 4, 6, 14.

⁷⁶ Ibid., 14-15, 17. Emphasis in original.

⁷⁷ Oral history interview of Hugh Dryden, March 26, 1964, folder: Dryden, Mercury Tape, Dryden subseries, Deputy Administrators series, NHDRC, 1.

⁷⁸ Johnson claimed he had to interview “about twenty” candidates before he found one, Webb, willing to take the job in the face of uncertainty over NASA’s future and the perceived threat of a possible DoD takeover of the space program. See Lyndon B. Johnson, *The Vantage Point: Perspectives on the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), 278. Another source maintains Johnson stated he interviewed 28 individuals; see Eugene M. Emme, “Presidents and Space,” in Frederick C. Durant, III, Editor, *Between Sputnik and the Shuttle: New Perspectives on American Astronautics*, AAS History Series, volume 3 (San Diego, CA: Univelt, Inc., 1981), 39. Whatever the specific case, after perfunctory Senate confirmation hearings, Webb was sworn in on February 14, 1961 and is the key figure in NASA throughout the rest of the period this dissertation covers and until his resignation effective in October 1968.

one single word or hint of action has been forthcoming from the Kennedy administration.”⁷⁹ Associate Administrator Seamans said the feeling in NASA was, “Why would anybody turn it down? It must mean that the plans for NASA are being pulled in.”⁸⁰ The fact that Kennedy did not endorse the Wiesner report *in toto* at a press conference when he said, “I don’t think anyone is suggesting their views are necessarily in every case the right views”⁸¹ was perhaps some small solace.

Things began to look up for NASA after Webb assumed the reins. With perhaps only slight exaggeration, one source states, “From that moment on, NASA seems to have been watched over by a solicitous Providence.”⁸² For instance, on February 21, 1961, a week after Webb was sworn in, there was the first completely successful Mercury-Atlas test launch. Webb has been described as the prototypical politician manager who knew where all the bodies were buried, could play congressional appropriations committees with finesse, and was willing to employ hard-eyed calculation and deviousness when required. Whatever one’s opinion of his methods, there is little doubt that from the moment of his appointment, “The role he played from then until his resignation in the fall of 1968 was indispensable.”⁸³

Kennedy’s conversion to an ardent space racer and competitor was not immediate however. In early February he said, “We are very concerned that we do not put a man in space in order to gain some additional prestige and have a man take disproportionate risk. . . . even if we should come in second in putting a man in space, I will be satisfied if when we finally put a man in space his chances of survival are as high as I think they must be.”⁸⁴ Logsdon explains Kennedy’s hesitancy to make any basic changes to

⁷⁹ T. Keith Glennan, diary entry for January 3, 1961, *The Birth of NASA: The Diary of T. Keith Glennan*, J.D. Hunley, Editor, with an Introduction by Roger D. Launius., NASA SP-4105 (Washington, DC: USGPO, 1993), 93. In further diary entries until he departed Washington on January 19 Glennan makes clear NASA was still completely in the dark as to Kennedy’s plans for NASA specifically or the space program in general.

⁸⁰ Cited by Murray and Cox, 69.

⁸¹ Kennedy, News Conference, January 25, 1961, *Public Papers of the President, 1961*, p. 15.

⁸² Murray and Cox, 70.

⁸³ *Ibid.*, 71. For a full biography of Webb see W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995).

⁸⁴ Kennedy, News Conference, February 8, 1961, *Public Papers of the President, 1961*, p. 70.

Eisenhower's space framework continued until Kennedy "... became convinced that space achievement was linked closely to the power relationships between East and West, and was a symbolic manifestation of national determination and vitality." When he finally did make that connection, then there was a dramatic reversal of Eisenhower's policy and a decision to go to the moon.⁸⁵ Perhaps Eisenhower's first intense exposure to the space program was a meeting on March 22, 1961 with Johnson and officials from NASA who were requesting a supplemental appropriation.

Before asking for an acceleration of the space program, Webb sought and obtained new Secretary of Defense McNamara's opinion. Webb recorded, "With respect to the question of accelerating our present program, Secretary McNamara feels that a most careful review should be made, that this should be done about four weeks from now if we can wait that long, and has a general feeling that we should accelerate the booster program." Webb stated their meeting's flavor "... was clearly one in which he [McNamara] at this time would generally support the kind of items" Webb was considering submitting to the BoB.⁸⁶ Accordingly, Webb formally requested BoB Director David Bell consider a NASA request for a supplemental appropriate of \$308 million, increasing NASA's FY61 budget to \$1.42 billion; the two main items were \$173 million for the Saturn superbooster project and \$42 million to officially begin Project Apollo, a step Eisenhower had specifically prohibited in December 1960.⁸⁷

When Bell was initially hesitant to forward NASA's request to Kennedy, Dryden perceptively replied, "Well, he may not feel he has the time, or you may not feel he has the time, but whether he likes it or not, he's going to have to consider it. Events will force this."⁸⁸ Kennedy, Johnson, NASA officials, and others did finally gather for the March 22 meeting which Logsdon says began Kennedy's close in-

⁸⁵ Logsdon, *Decision to Go to the Moon*, 93.

⁸⁶ James E. Webb, Memorandum for the Record, February 24, 1961, SPI document 984, p. 1.

⁸⁷ Webb, letter to David Bell, March 17, 1961, folder: Apollo 1961 Decision Documentation, box: White House, Presidents, Kennedy, Correspondence, Apollo Decision Documentation, NHDRC, 1.

⁸⁸ Cited by Seamans in an oral history interview by Logsdon, December 5, 1967, folder: Seamans/Logsdon interview, Seamans subseries, Deputy Administrators series, NHDRC, 4.

volvement in space policy that was to culminate two months later in his lunar landing speech.⁸⁹ Webb's main point was that, "We cannot regain the prestige we have lost without improving our present inferior booster capability, and doing it before the Russians make a major breakthrough in the multi-million pound thrust range. . . . the extent to which we are leaders in space science and technology will in some large measure determine the extent to which we, as a nation, pioneering on a new frontier, will be in a position to develop this emerging world force. . . ." The next day, after a supplemental meeting with Johnson, new NASC Executive Secretary Edward C. Welsh, Wiesner, and Bell, Kennedy decided he would grant most of the funds required to accelerate the Saturn booster and other launch vehicles but would *not* authorize the millions requested for the official commencement of Project Apollo. Clearly, at the end of March, Kennedy ". . . had not made up his mind at this time what his general attitude toward manned flight would be."⁹⁰ Kennedy approved \$125.7 million of NASA's \$308 request.⁹¹

To The Moon

The major event that seems to have forced Kennedy's hand was another spectacular Soviet first: on April 12, 1961 the Soviets launched the first human in space, Yuri Gagarin, who flew in space for 108 minutes in his Vostok spacecraft. Any number of historians cite "the enormous reaction of the public and the press to the Soviet man-in-space achievement," with striking parallels to the furor that erupted after Sputnik three-and-a-half years earlier.⁹² One team of scholars says Gagarin's flight was a "crushing disappointment to many Americans," that Congress was "stampeded" by the flight, and that the flight ". . . provided a tremendous impetus to the desires of Americans . . . to become first once again."⁹³ Khrushchev reportedly exclaimed, "Let the capitalist countries catch up with our country!" while the Central

⁸⁹ Logsdon, *Decision to Go to the Moon*, 91.

⁹⁰ *Ibid.*, 97-99.

⁹¹ Lambright, *Powering Apollo*, 91.

⁹² Eugene M. Emme, "Historical Perspectives on Apollo," *Journal of Spacecraft and Rockets* 5 (April 1968): 378.

⁹³ Loyd S. Swenson, James M. Grimwood, and Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966), 334-35.

Committee of the Communist party claimed the Gagarin flight “. . . embodied the genius of the Soviet people and the powerful force of socialism.”⁹⁴ Khrushchev further gloated about Gagarin, “This victory is another triumph of Lenin’s idea, confirmation of the correctness of the Marxist-Leninist teaching. . . . This exploit marks a new upsurge of our nation in its onward movement towards communism.”⁹⁵

On the day of the Gagarin flight Kennedy held a press conference during which he stated, concerning the string of Soviet space firsts since Sputnik, “However tired anybody may be, and no one is more tired than I am, it is a fact that it is going to take some time” to catch up with the USSR. The United States was behind and “. . . the news will be worse before it is better, and it will be some time before we catch up.”⁹⁶ Privately, Kennedy reportedly remarked, “Russian housing is lousy, their food and agricultural system is a disaster, but those facts aren’t publicized. Suddenly we’re competing in a race for space we didn’t even realize we were in.”⁹⁷ Congressmen demanded a response. Representative James Fulton declared, “I believe we are in a race, and I have said many times, Mr. Webb, ‘Tell me how much money you need and this committee will authorize all you need.’” Representative Anfuso remarked, “I want to see our country mobilized to a wartime basis. . . . I want to see what NASA says it is going to do in 10 years done in 5. I want to see some first coming out of NASA, such as the landing on the moon.”⁹⁸

Within two days, by April 14, it appears Kennedy “. . . reluctantly came to the conclusion that, if he wanted to enter the duel for prestige with the Soviets, he would have to do so with the Russians’ own weapon, space achievement.”⁹⁹ A key meeting took place on that date with Sorensen, Bell, Wiesner, Webb, Dryden, and Kennedy. Also in attendance was journalist Hugh Sidey, who later recorded Kennedy’s main problem with catching up with the Soviets in space: “The cost. That’s what gets me. . . .

⁹⁴ Cited by Lambright, *Powering Apollo*, 93.

⁹⁵ Cited in Jay Holmes, *America on the Moon: The Enterprise of the Sixties* (New York: J.B. Lippincott Co., 1962), 84.

⁹⁶ Kennedy, News Conference, April 12, 1963. *Public Papers of the President, 1961*, 262-63.

⁹⁷ Beschloss, 114.

⁹⁸ Logsdon, *Decision to Go to the Moon*, 103.

⁹⁹ *Ibid.*, 105.

When we know more, I can decide if it's worth it or not. If someone can just tell me how to catch up. Let's find somebody - anybody. I don't care if it's the janitor over there, if he knows how. There's nothing more important. . . . I'm determined to get an answer."¹⁰⁰ It appears then that while Kennedy had not made his final decision, the stage was set for a full-scale inquiry that would supply Kennedy with specific available options from which he could select his precise plan.¹⁰¹

Kennedy initiated the information-gathering process by tasking his vice president. He charged Johnson as Chairman of the NASC ". . . to be in charge of making an overall survey of where we stand in space" and to answer numerous questions, including:

1. Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to land on the moon, or by a rocket to go to the moon and back with a man? Is there any other program which promises dramatic results in which we could win? 2. How much additional would it cost? 3. Are we working 24 hours a day on existing programs? If not, why not? . . . Are we making maximum effort?

Kennedy asked for a reply "at the earliest possible moment."¹⁰² Johnson surveyed numerous individuals in the scientific, business, and military communities for their inputs on Kennedy's questions; however, the task of actually writing the response to the president fell to Seamans, Deputy DDR&E John Rubel and Willis Shapley, Assistant Chief of the BoB's Military Division. Webb and McNamara would sign the document. Within a day McNamara gave a partial response: "Dramatic achievements in space, therefore, symbolize the technological power and organizing capacity of a nation. It is for reasons such as these that

¹⁰⁰ Hugh Sidey, *John F. Kennedy, President* (New York: Atheneum, 1963), 122-23. See also Logsdon, *Decision to Go to the Moon*, 105.

¹⁰¹ Logsdon, *Decision to Go to the Moon*, 107. The Bay of Pigs fiasco began the next day, April 15. It remains undetermined exactly what influence this event may or may not have had on Kennedy's lunar landing decision. Scholars differ in their assessments. While no explicit evidence exists linking it directly to Kennedy's thinking on his response to Gagarin, Lambright's conclusion seems reasonable in that the Bay of Pigs ". . . created an atmosphere at the White House in which the president felt he had to assert leadership right away." *Powering Apollo*, 94-95. Logsdon concurs, stating, "The fiasco of the Bay of Pigs reinforced Kennedy's determination, already strong, to approve a program aimed at placing the United States ahead of the Soviet Union in the competition for firsts in space. It was one of the many pressures that converged on the president at that time, and thus its exact influence cannot be isolated." *Decision to Go to the Moon*, 112.

¹⁰² Kennedy, Memorandum for Vice President Lyndon B. Johnson, April 20, 1961, *Exploring the Unknown, Volume I*, 424.

major achievements in space contribute to national prestige. . . . Our attainments constitute a major element in the international competition between the Soviet system and our own."¹⁰³

As Johnson was gathering information and opinions, Kennedy tipped his hand at a press conference on April 21, 1961 when he said, "We have to make a determination whether there is any effort we could make in time or money which could put us first in any new area. . . . If we can get to the moon before the Russians, we should. . . . I think we face an extremely serious and intensified struggle with the Communists."¹⁰⁴ When Kennedy signed the amendment to the Space Act on April 25 making the vice president the head of the NASC, Kennedy said it was a ". . . key step toward moving the United States into its proper place in the space race. . . . I intend that America's space effort shall provide the leadership, resources, and determination necessary to step up our efforts and prevail on the newest of man's physical frontiers."¹⁰⁵

Eight days after Kennedy's April 20 memo, Johnson gave Kennedy a preliminary response. He explained he had consulted with such luminaries as NASA's von Braun, Schriever and Vice Admiral and Deputy Chief of Naval Operations John Hayward, NASA leaders, Wiesner, and BoB senior officials, along with members of the business community. Johnson said the emerging consensus was that the "Soviets are ahead of the United States in world prestige attained through impressive technological accomplishments in space. . . ." While the United States has greater resources than the USSR to devote to attaining space leadership, it has so far ". . . failed to make the necessary hard decisions to marshal those resources to achieve such leadership." In addition, "Dramatic accomplishments in space are being increasingly identified as a major indicator of world leadership" and if the United States does not act soon ". . . the margin of control over space and over men's minds through space accomplishments will have swung so far on the Russian side that we will not be able to catch up, let alone assume leadership." LBJ

¹⁰³ McNamara, Memorandum to Johnson, Brief Analysis of Department of Defense Space Program efforts, April 21, 1961, *Exploring the Unknown, Volume I*, 424-25.

¹⁰⁴ Kennedy, News Conference, April 21, 1961, *Public Papers of the President, 1961*, pp. 310-311. The second portion of the citation is the first and only time the author has been able to discover in which JFK stated very explicitly the concept of beating the Russians to the moon.

¹⁰⁵ Kennedy, Statement upon signing HR 6169, April 25, 1961, *ibid.*, 321-22.

said manned exploration of the moon would be an achievement of not only great propaganda value but may be the one space spectacular that America could accomplish before the USSR. He recommended that if more resources and efforts were quickly put into the American space program, American could conceivably be first in 1966 or 1967 to circumnavigate the moon and perhaps even accomplish a lunar landing. However, at the present time, "We are neither making maximum effort nor achieving results necessary if this country is to reach a position of leadership."¹⁰⁶

Johnson reinforced his conclusions, and telegraphed Kennedy's, at a meeting on May 3, 1961:

Free men are losing real estate to the Communists, and we are behind the Communists in the race for space. I believe it is the position of every patriotic and knowledgeable American that past policies and performances in space have not been enough to give this country leadership. That is the conclusion of the President. Moreover, that is, and has long been my conclusion.

Johnson added that Kennedy was determined to move the United States into its proper position in space, one of leadership: "There is no other place for our country." Johnson closed by remarking Kennedy appeared ready to expand the total program from \$22 billion over ten years to \$33 billion.¹⁰⁷ The remaining task was simply for McNamara and Webb to submit a detailed plan.

Two days later, on May 5, the first American finally went into space. Alan B. Shepard had a 15 minute, 116 mile spaceflight from Cape Canaveral, FL. Kennedy apparently had considered the space for prestige question in some detail both before and after Shepard's flight. Attempting to get a sense of the Third World's perspective, Kennedy asked Tunisian president Habib Bourguiba after Shepard's flight if he would rather have an extra billion dollars a year in American foreign aid or have the United States mount a lunar landing effort. "Bourguiba stood silent for several moments. Finally Bourguiba said, 'I wish I could tell you to put it in foreign aid, but I cannot.'"¹⁰⁸ The question of America's prestige in the

¹⁰⁶ Johnson, Memorandum to Kennedy, April 28, 1961, *Exploring the Unknown, Volume I*, 427-29.

¹⁰⁷ Johnson, Opening Statement for the Vice President's Ad Hoc Meeting on Space, May 3, 1961, SPI document 1121, p. 1; and transcript of the meeting itself, 12. *Exploring the Unknown, Volume I* reprints the transcript of the meeting, 433-439, but not Johnson's opening statement.

¹⁰⁸ Related in Murray and Cox, 83.

international community clearly weighed heavily on Kennedy after the Gagarin flight. America's first human in space only three weeks later only reinforced the idea that space was indeed the cold war competitive arena of the future. Logsdon explains that Shepard's flight was "one final event [which] helped ensure that an accelerated space program would be accepted by the president and the country. . . . the unqualified success of the flight, swept away any of Kennedy's lingering doubts with regard to the role of the man in space flight."¹⁰⁹

Important DoD Input Into the Decision

Before the final Webb/McNamara position paper of May 8, 1961 was prepared, Johnson received final written replies from individuals with whom he had earlier spoken.¹¹⁰ Schriever's is particularly important because it highlights why the Air Force's space-oriented officers supported the lunar landing effort both before and after Kennedy's impending decision. Schriever said it was his ". . . strong conviction that achievements in space in the critical decade ahead will become a principal measure of this nation's position in world leadership - a world in which it is becoming increasingly obvious that there will be no second." Schriever felt the main obstacle in America's space program was ". . . the artificial and dangerous constriction of 'space for peaceful purposes' and 'space for military uses.'" When coupled with an "attitude of defeatism and a seeming resignation to second place in the space competition with the Soviets," a dangerous condition results which ". . . places at serious and unacceptable risk both our national prestige and our military security." Schriever said America's past space policy had failed to recognize ". . . the military potential of space and the fact that achievements in space have been the single most important influence in the world prestige equation." Schriever concluded that a manned lunar landing and return would be the appropriate centerpiece of "a greatly expanded and accelerated space program [which]

¹⁰⁹ Logsdon, *Decision to Go to the Moon*, 121, 123.

¹¹⁰ Logsdon makes an important point concerning the overall process leading to the lunar landing decision and how the decision was being justified in non-scientific terms: "At no time during the consultations was PSAC as a body asked for its opinion on the choice of a lunar landing as a central feature of an accelerated space program." *Decision to Go to the Moon*, 118. PSAC's influence, and that of Wiesner as head of the Office of Science and Technology within the White House, did not disappear during the Kennedy administration but the scientists' input into the space program's direction and overall space policy definitely waned when compared to Killian, Kistiakowsky, and PSAC under Eisenhower.

must reflect a singleness of purpose, a sense of urgency, a full acceptance of the Soviet challenge, and a refusal to admit there is any place for the United States but first."¹¹¹

Schriever also explained to Logsdon that the USAF's space community supported the lunar landing program because "... it would put a focus on our space program. . . . I felt that we needed a major national space program for prestige purposes, for those things we could see as having national security implications and because of the need for advancing technology." Logsdon also notes this was the same basic idea the Air Force had supported since 1958: using a lunar landing as a central feature to give focus and lend global impact to the American space program. As to whether, by early 1961, anyone thought the Air Force should manage the lunar landing program, Schriever told Logsdon, "That never came up. At that point, there was no argument who was going to run the program."¹¹² In a perfect world, the Air Force certainly would have preferred to direct the lunar landing program. But a NASA-directed program was infinitely preferable for the Air Force than no program at all because of the facilities, technology, and experience it would create for America and make available for potential defense applications.

Though Schriever and his corps of space-oriented officers provided important input to Johnson, the most important figure in the DoD input to the lunar landing decision was Secretary of Defense McNamara. Over the weekend of May 6-7, 1961 a group consisting of Webb, McNamara, and various subordinates such as Dryden and Seamans for Webb, Gilpatric and DDR&E Harold Brown and his Deputy John Rubel for McNamara, along with BoB representative Willis Shapley, hammered out the final decisions. McNamara clearly had no problem with NASA pursuing an extensive human spaceflight program for prestige purposes. In fact, at one point in the lunar landing discussion that weekend, NASA Associate Administrator Seamans recalled McNamara remarked, "Well, are you sure that is a bold enough step?" He wondered, "Now are you sure we shouldn't take an even bigger bite and consider manned planetary [travel]? Seamans said the NASA personnel were "... very strong in the view that this was too

¹¹¹ Lieutenant General Bernard A. Schriever, Commander, Air Force Systems Command, Memorandum to Johnson, April 30, 1961, 168.7171-151, AFHRA, 1-4.

¹¹² Logsdon, *Decision to Go to the Moon*, 114-115, based on Logsdon's oral history interview of Schriever, November 3, 1967.

big a step to commit the country to."¹¹³ Seamans averred that the only thing DoD brought up was the question of large solid rocket motors, believing the Air Force should be granted additional funding to pursue this project. Other than that, McNamara was receptive to the NASA staff's ideas for establishing a lunar landing and return as America's primary space goal in the 1960s.¹¹⁴ The May 8 Webb/McNamara final memo appears to have been drafted primarily by Seamans and Rubel, based on a report Rubel had previously drafted, with last-minute editorial input from Webb.¹¹⁵ Again, in all the final discussions and drafts, "It was absolutely accepted that this was NASA's responsibility, to take this on, and there was no question of, say, the DOD wondering if we should do it or in any way doing anything but saying, 'This is your responsibility. Jim Webb, you and NASA have got to do this.'"¹¹⁶

Kennedy Committed

When all was said and done, the May 8, 1961 Webb/McNamara recommendations, over 25 pages long, are the most important space policy document of the 1960s. Webb and McNamara recommended a \$626 million add-on to the 1962 space budget, all of which would go to NASA except \$77 million to the DoD for the solid rocket engine R&D. The objective was "manned lunar exploration in the latter part of this decade." The men explained that space projects can be undertaken for four reasons: scientific knowledge; commercial civilian value; military value; or national prestige. The United States was ahead in the scientific and military categories and had greater potential in the commercial arena but trailed in the space for prestige field. Therefore, "This nation needs to make a positive decision to pursue

¹¹³ Oral history interview of NASA Associate Administrator Robert C. Seamans, Jr., by the author, July 5, 1996; Seamans oral history interview of December 5, 1967, by Logsdon, *supra*, 11. See numerous other sources verifying the McNamara general disposition and interplanetary suggestion, most of which are based on participants' interviews. For example, see Leonard Mandelbau, "Apollo: How the United States Decided to Go to the Moon," *Science* 163 (February 1969): 651. Seamans summarizes his involvement in his biography *Aiming at Targets* (Beverly, MA: Memoirs Unlimited, 1994), 113ff, republication of which by NASA in a modified version is forthcoming as part of the NASA History Series.

¹¹⁴ *Ibid.* It should be noted that the author repeatedly contacted Mr. McNamara with requests for an oral history interview to explore not only his role in the lunar landing decision but in all the major issues of this dissertation's remaining chapters. McNamara finally responded by saying, "I would like to help but I do not wish to rely on my memory to discuss events of 30 plus years ago and I do not have time to do the necessary research work." McNamara, note to the author, October 15, 1996.

¹¹⁵ See Seamans, *Aiming at Targets*, 113ff. and Logsdon, *Decision to Go to the Moon*, 125ff.

¹¹⁶ Oral history interview of Seamans by Logsdon, December 5, 1967, p. 12.

space projects aimed at enhancing national prestige. Our attainments are a major element in the international competition between the Soviet system and our own. . . . The non-military, non-commercial, non-scientific but 'civilian' projects such as lunar and planetary exploration are, in this sense, part of the battle along the fluid front of the cold war. Such undertakings may affect our military strength only indirectly if at all, but they have an increasing effect upon our national posture. . . . It is vital to establish specific missions aimed mainly at national prestige."¹¹⁷

The Webb/McNamara package endorsed a lunar landing before the end of the decade because it ". . . represents a major area in which international competition for achievement in space will be conducted It is man, not merely machines, in space that captures the imagination of the world." They acknowledge a lunar landing "will cost a great deal of money" and require "large efforts for a long time." Nevertheless, given "the Soviets have announced lunar landing as a major objective of their program" the United States has little choice if it wants to compete: "If we fail to accept this challenge it may be interpreted as a lack of national vigor and capacity to respond. . . . perhaps the greatest unsurpassed prestige will accrue to the nation which first sends a man to the moon and returns him to earth. . . . The exploration of space will not be complete until man directly participates as an explorer."¹¹⁸ In addition to the lunar landing proposal, the package also recommended the United States develop: a worldwide operational satellite communications capability; a worldwide satellite weather prediction system; and the large scale boosters, both solid- (by the DoD) and liquid-fueled (by NASA) because of their potential military use and their obvious necessity in the lunar landing effort. These large rockets were the DoD's only real non-prestige-related interest in the accelerated program: "It is certain . . . that without the capacity to

¹¹⁷ James E. Webb and Robert S. McNamara. Memorandum for Vice President Lyndon B. Johnson. Recommendations for Our National Space Program: Changes, Policies, Goals. May 8, 1961. *Exploring the Unknown, Volume I*, 441, 444, emphasis in original.

¹¹⁸ Ibid., 446-47, and the original SPI document 300 not reprinted in *Exploring the Unknown, Volume I*, 25. Nevertheless, Webb and McNamara were not absolutely sure that the Soviets were engaged in a race to the moon with the United States. These two men stated the Soviets ". . . may have begun to plan for such an effort years ago. They may have undertaken important first steps which we have not begun. . . . We are uncertain of Soviet intentions, plans or status. Their plans, whatever they may be, are not more certain of success than ours. . . . It is possible, of course, that the Soviet program is not actually the result of careful planning toward long range goals. It may appear that way only in retrospect." *Exploring the Unknown, Volume I*, 446, 448.

place large payloads reliably into orbit, our nation will not be able to exploit whatever military potential unfolds in space."¹¹⁹

Johnson quickly endorsed the Webb/McNamara conclusions and forwarded them to Kennedy because Kennedy had dispatched Johnson on a fact-finding tour of Southeast Asia. Logsdon records that on May 10, 1961 Kennedy met with his close advisers to ratify the Webb/McNamara package forwarded by Johnson. McGeorge Bundy recalled, "the President had pretty much made up his mind to go" and was not particularly interested in hearing arguments to the contrary. Kennedy approved the package exactly as McNamara and Webb had laid it out.¹²⁰ On May 25, 1961 Kennedy announced his decision to the nation in a "Special Message to the Congress on Urgent National Needs."

Kennedy said all the actions he proposed related to the responsibility of America to be "the leader in freedom's cause" because, "The adversaries of freedom plan to consolidate their territory - to exploit, to control, and finally to destroy the hopes of the world's newest nations. . . . It is a contest of wills and purposes as well as force and violence - a battle for the minds and souls as well as lives and territory. And in that contest, we cannot stand aside." Accordingly, Kennedy actually proposed many initiatives before detailing his lunar landing plan. He discussed measures "to turn recession into recovery," to aide the economic and social progress of the developing nations, to increase NATO's strength, to increase the American strategic deterrent, to triple United States civil defense expenditures, and to strengthen the Arms Control and Disarmament Agency.¹²¹ In fact, the lunar landing decision was the final major point in his speech. Kennedy explained:

¹¹⁹ Ibid., 16. However, even in the context of this document devoted to laying out a plan for increasing America's prestige via space projects, the authors felt necessary to highlight the crucial role of reconnaissance. On page 24 the report stated, "The existence of the Iron Curtain creates an asymmetry in military needs between the U.S. and the Soviet Union which compels us to undertake a number of military missions utilizing space technology that would appear to be unneeded by the USSR. We have in the past and are likely in the future to continue to feel the need for reconnaissance. The SAMOS project is intended to fill this need." McNamara and Webb stated that SAMOS, the Midas program for the "earliest possible warning of ballistic missile attack" and the DISCOVERER program made for a three-way American investment in reconnaissance satellites exceeding a billion dollars.

¹²⁰ Logsdon, 126.

¹²¹ Kennedy, Special Message to the Congress on Urgent National Needs, May 25, 1961, *Public Papers of the President*, 396-403.

Finally, if we are going to win the battle that is now going on around the world between freedom and tyranny, the dramatic achievements in space which occurred in recent weeks should have made clear to us all, as did the sputnik in 1957, the impact of this adventure on the minds of men everywhere who are attempting to make a determination of which road they should take. . . . it is time to take longer strides - time for a great new American enterprise - time for this Nation to take a clearly leading role in space achievement, which in many ways may hold the key to the future on earth. . . . For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last. . . . We go into space because whatever mankind must undertake, free men must fully share. . . . I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth.

Kennedy made it perfectly clear that this would be “. . . a course which will last for many years and carry heavy costs. . . . If we are to go only half way, or reduce our sights in the face of difficulty, in my judgment it would be better not to go at all. . . . I believe we should go to the moon. But I think every citizen of this country as well as the Members of Congress should consider the matter carefully in making their judgment . . . because it is a heavy burden. . . .”¹²² Later that day at a NASA press conference featuring Webb, Dryden, and Seamans a reporter asked, “Is this an accelerated effort predicated on the assumption that we want to beat Russia to the moon.” NASA leaders replied simply, “Yes.”¹²³ Kennedy had clearly concluded that national prestige was an important element in national power because what other nations and people thought about American power “. . . was as important, if not more important, than the reality of that power. . . . A basic reason for the lunar landing decision was Cold War politics, phrased in terms of containing Soviet political gains from their space successes.”¹²⁴ Human spaceflight became, under Kennedy, one expression of that power. Johnson’s earlier conclusion that, “Failure to master space means being second best in every aspect. . . . In the eyes of the world first in space means first, period; second in space is second in everything”¹²⁵ became the Kennedy administration’s guiding space policy.

¹²² Ibid., 403-05.

¹²³ NASA, News Release No. 61-115, May 25, 1961, folder: JFK - Miscellaneous Clippings, box: White House, Presidents, Kennedy, Biography materials, NHDRC, 5-6.

¹²⁴ Logsdon, *Decision to Go to the Moon*, 134, 162.

¹²⁵ Cited in Walter McDougall, “Technocracy and Statecraft in the Space Age - Toward the History of a Saltation,” *American Historical Review* 87 (October 1982): 1025.

Logsdon summarizes that the lunar landing decision “. . . is perhaps the ultimate expression of ‘technological anticommunism’ in terms of which way of life can best master nature, not control men.”¹²⁶

Webb had earlier emphasized to Johnson the central importance of the financial question in not only the lunar landing decision, but the long-term execution of the program. Webb wrote the vice president,

I feel it imperative that you and the President understand we [Webb and McNamara] will need the assurance that the Nation is committed to this and that every effort will be made to put something between us and a situation in which we might be running like two foxes before two packs of hounds (Congress and the press), dependent only on our own skill and cunning to evade the pursuers and still carry on the work. . . . I want to make clear that we can only succeed if you are strongly with McNamara and me over the months and years ahead to do the really tough things we are going to have to do.¹²⁷

In this passage Webb identified the foremost space policy question of Kennedy’s remaining term and all of Johnson’s space presidency: what level of financial support was appropriate for the overall NASA program and the lunar landing program within it?

Some Consequences of the Decision

In the short term, the budgetary impact of Kennedy’s decision was tremendous. NASA’s FY62 budget was increased \$549 million; when coupled with the already-approved March supplemental, Kennedy had increased Eisenhower’s final NASA budget of \$1.1 billion by 61 percent in six months. In this process, “Congress approved his requests, almost without a murmur.”¹²⁸ Kennedy had a radically different economic philosophy than the fiscally cautious Eisenhower. Logsdon explains Kennedy preferred “. . . to use fiscal and monetary policy as tools for managing the national economy according to the tenets of the new [Keynesian] economics. Kennedy preferred government expenditures for needed programs instead of tax cuts as a means of injecting spending power into the economy.”¹²⁹ Therefore, Kennedy did

¹²⁶ Logsdon, *Decision*, 164.

¹²⁷ Webb letter to Johnson, May 4, 1961, folder: NASC 1960-1961, box: White House, National Aeronautics & Space Council, NHDRC, 1.

¹²⁸ Logsdon, *Decision*, 126, 129.

¹²⁹ *Ibid.*, 155.

not have a visceral disdain for large new spending proposals such as the lunar landing program, especially when this particular new venture meshed so nicely with his competitive cold war philosophy.

It is fortunate Kennedy was amenable to new spending because. "Project Apollo grew like a baby Paul Bunyan, and within two years consumed more than 50 percent of the entire NASA research and development budget. . . ."¹³⁰ Webb reorganized NASA by abolishing Glennan's all-inclusive Office of Space Flight Programs and creating two subdivisions, the Office of Manned Space Flight (OMSF) and the Office of Space Science and Applications. OMSF disproportionately benefited from the subsequent Apollo-induced massive NASA budget increases and was soon the dominant force within the NASA hierarchy, as OMSF's directors determined ". . . NASA's choice of future goals, controlled completely most of its budget, and preserved assiduously the separation of the space agency between manned and unmanned space flight constituencies."¹³¹

This concentration on human spaceflight was crushingly expensive. From Eisenhower's recommended level of \$1.1 billion for NASA in FY62, NASA's actual budget skyrocketed for the three years over which Kennedy had direct control: FY62, \$1.8 billion; FY63, \$3.7 billion; and FY64, \$5.1 billion.¹³² Of the FY62 figure, 50.7 percent was for human spaceflight, which increased to 65.8 percent of the FY64 total.¹³³ NASA employees went from 10,000 in 1960 to 34,000 in 1966 and NASA contractor

¹³⁰ R. Cargill Hall, "Instrumented Exploration and Utilization of Space: The American Experience," in Eugene M. Emme, editor, *Two Hundred Years of Flight in America*, American Astronautical Society History Series, volume 1 (San Diego, CA: Univelt, Inc., 1977), 190.

¹³¹ R. Cargill Hall, "Thirty Years Into the Mission: NASA at the Crossroads," in *Reading Selections: Space Issues Symposium* (Maxwell AFB, AL: Air War College, 1988), 135.

¹³² NASA, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities* (Washington, DC: USGPO, 1996), A-30. NASA's budget would peak at \$5.25 billion in FY65 and decline steadily thereafter. The NASA historian explains that this FY65 figure was 5.3% of the federal budget, which would have equaled \$65 billion in FY92's budget, a year in which NASA's actual budget stood at less than \$15 billion. See Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 68.

¹³³ Robert Rosholt, *An Administrative History of NASA: 1958-1963*, NASA SP-4101 (Washington, DC: USGPO, 1966), 245.

employment grew ten-fold from 37,000 to 377,000 in the same period.¹³⁴ Roger Launius estimates at the peak of its employment, one in fifty Americans worked on some aspect of Project Apollo.¹³⁵ Most estimates of the overall cost of the lunar landing program are between \$20-25 billion, a figure that translates to \$91-114 in 1989 dollars.¹³⁶ The lunar excursion module portion of the Apollo spacecraft cost fifteen times in weight in gold.¹³⁷ One assessment is that NASA's mobilization for Project Apollo was "... comparable, in relative scale, to that undertaken by the U.S. to fight World War II."¹³⁸ NASA, by size of budget, was the fifth largest federal organization, after Defense, Treasury, Agriculture, and Health, Education, and Welfare.¹³⁹

Truly impressive technology resulted from these outlays, however. The Saturn V rocket that would take the Apollo spacecraft to the moon had greater than 8 million parts,¹⁴⁰ and the explosive potential of a million pounds of TNT,¹⁴¹ (a megaton, which is more than most nuclear warheads) and 7.5 million pounds of thrust¹⁴², far in excess of any ICBM. The Saturn V at 363 feet tall was six stories higher than the Statue of Liberty, weighted six million pounds, and was the approximate size and weight of a Navy destroyer.¹⁴³ The United States spent an estimated \$2.2 billion just constructing the infrastructure at

¹³⁴ Richard Hirsch and Joseph Trento, *The National Aeronautics and Space Administration* (New York: Praeger Publishers, 1973), table on 57.

¹³⁵ Launius, *History of the U.S. Civil Space Program*, 70.

¹³⁶ Alex Roland, "The Lonely Race to Mars: The Future of Manned Spaceflight," in Radford Byerly, Jr., editor, *Space Policy Alternatives* (Boulder, CO: Westview Press, 1992), 37. Others citing similar figures are Lambright, *Powering Apollo*, 2; and R. Cargill Hall, "Project Apollo in Retrospect," in *Blueprint for Space* (Washington, DC: Smithsonian Institution Press, 1992), 155.

¹³⁷ Hirsch and Trento, 115.

¹³⁸ Sylvia K. Kraemer, "NASA and the Challenge of Organizing for Exploration," in Roger Launius, editor, *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, AAS History Series volume 18 (San Diego, CA: Univelt, Inc., 1995), 91.

¹³⁹ Van Dyke, *supra*, 27.

¹⁴⁰ *Ibid.*

¹⁴¹ Cox and Murray, 88.

¹⁴² Lambright, *Powering Apollo*, 187.

¹⁴³ *Ibid.*

Cape Canaveral/Kennedy, Houston, TX, and Huntsville, AL to support Apollo: tracking and communications facilities alone cost another \$300 million.¹⁴⁴

By the end of the Kennedy administration, however, the era of blank checks for NASA budgets appeared to be over. For FY64 Kennedy actually asked Congress for a \$5.7 billion dollar NASA budget but Congress approved only \$5.1 billion. The \$600 million difference “. . . was the largest, both in absolute and relative terms, ever made on a NASA budget request.”¹⁴⁵ NASA had problems with cost estimates, as Mercury was originally budget for approximately \$200 million but cost almost \$400 million.¹⁴⁶ The question that arises is, did Kennedy's commitment to competing for prestige via human spaceflight and a lunar landing falter before his assassination in November 1963? Or did he remain firmly committed to a space race with the Soviets?

Did Kennedy's Commitment Hold Firm?

Kennedy continued throughout 1961 to support his earlier decision. In October he said, “Until we have a man on the moon, none of us will be satisfied. . . . we started far behind, and we're going to have to wait and see whether we catch up. But I would say that I will continue to be dissatisfied until the goal is reached.”¹⁴⁷ A month later he echoed this sentiment when he stated, “I say this with complete conviction, there is no area where the United States received a greater setback to its prestige as the number one industrial country in the world than in being second in the field of space in the fifties. . . . And while many may think that it is foolish to go to the moon, I do not believe that a powerful country like the United States, which wishes to demonstrate to a watching world that it is first in the field of technology

¹⁴⁴ Hirsch and Trento, 115.

¹⁴⁵ Congress, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*, Thirteenth Report, 89th Congress, 1st Session, House Report No. 445, June 4, 1965, p. 74.

¹⁴⁶ Ibid. A NASA meteorological satellite, Nimbus, had cost overruns of \$9 million by mid-1963 in a total contract of \$22 million. An orbiting astronomical observatory had cost overruns of \$34 million in a \$92 million contract.

¹⁴⁷ Kennedy, News Conference, October 11, 1961, *Public Papers of the Presidents, 1961*, p. 662.

and science . . . want[s] to permit the Soviet Union to dominate space. . . ."¹⁴⁸ In National Security Action Memorandum (NSAM) 144 of April 11, 1962, Kennedy awarded Apollo the "DX" rating, signifying it was among those projects "being in the highest national priority category for research and development and for achieving operational capability" and thus had first call in case of shortages of material or labor.¹⁴⁹

Nevertheless, Webb reports a discussion he had with Kennedy in mid-1962 in which Kennedy " . . . wanted to talk a little about the relation of this plan [Apollo] to that of the Russians. . . . He said he still thought the Russians were ahead in terms of world opinion." But, "He was quite concerned about the high level of expenditures involved in our program, plus the military program, and urged that everything be done that could possibly be done to see that we accomplish the results that would justify these expenditures and that we not expend funds beyond those that could be thoroughly justified."¹⁵⁰ While in no way implying Kennedy was questioning his original commitment to a lunar landing, his statements to Webb do at least indicate a level of concern with the high level of expenditures required for Project Apollo a year after his decision. Kennedy's friend and science adviser Jerome Wiesner recalled that by August 1962, Kennedy expressed "great irritation" with the ever-increasing cost trend in the space program.¹⁵¹ A BoB document from that same month attests to the fact that, "The President's desire [is] that the space programs be given an especially critical review in view of the prospective large increases in expenditures."¹⁵²

¹⁴⁸ Kennedy, Address at a dinner of the California Democratic Party, November 18, 1961, *ibid.*, 734.

¹⁴⁹ NSAM 144, Assignment of Highest National Priority to the Apollo Manned Lunar Landing Program, April 11, 1962, NSA PD document 824, p. 1.

¹⁵⁰ Webb letter to Dryden and Seamans, May 4, 1962, folder: Webb, Correspondence, Jan-Jun 1962, Webb subseries, Administrators series, NHDRC, 1.

¹⁵¹ Oral history interview of Jerome Wiesner, July 24, 1974, Jerome Wiesner file, Biographical series, NHDRC, 4.

¹⁵² BoB, Military Division, Draft Staff Report, Special Space Review, August 1962, folder: DOD and NASA Space Programs 1962, box 20, NARA RG 200, Robert S. McNamara papers, p. 1-1.

Concern over financial pressures did not modify Kennedy's public rhetoric on the space issue. At Rice University in September 1962 he delivered his second famous space-related address and wholeheartedly endorsed the lunar goal:

The exploration of space will go ahead, whether we join in it or not . . . and no nation which expects to be the leader of other nations can expect to stay behind in this race for space. . . . We mean to be part of it - we mean to lead it. . . . we shall not see it [space] be governed by a hostile flag of conquest, but by a banner of freedom and peace. . . . The vows of this nation can only be fulfilled if we in this Nation are first, and, therefore, we intend to be first. . . . our leadership in science and in industry, our hopes for peace and security, our obligations to ourselves as well as to others, all require us to become . . . the world's leading space-faring nation. . . . only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war. . . . We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because . . . that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win. . . . We do not intend to stay behind, and in this decade we shall make up and move ahead.¹⁵³

1962 Review

Within the White House, however, there were limits to Kennedy's acceptance of Apollo's budget increases. A dispute arose within NASA between Webb and the person he chose to head OMSF, D. Brainerd Holmes. Holmes was therefore directly responsible for day-to-day management of the Apollo program. Holmes believed Apollo was of such critical importance that it should proceed on an all-out, crash basis, with access to virtually unlimited funds. He wanted a \$400 million supplemental appropriation for Apollo so he could actually accelerate the schedule to permit a lunar landing in 1967. Webb's position was that Apollo should be in some kind of relative balance with NASA's other responsibilities such as space science.¹⁵⁴ By November (just after the Cuban Missile Crisis) the dispute reached Kennedy, who asked for Webb's opinion. Webb argued, "The objective of our national space program is to become pre-eminent in all important aspects of this endeavor. . . ." In Webb's mind this meant that ". . . the manned lunar landing program, although of highest national priority, will not by itself create the pre-

¹⁵³ Kennedy, Address at Rice University, September 12, 1962, *Public Papers of the Presidents, 1962* (Washington, DC: USGPO, 1963), 669.

¹⁵⁴ For background on the Holmes-Webb controversy see Seamans, *Aiming at Targets*, 131ff, and Logsdon, "The Evolution of U.S. Space Policy and Plans," in Logsdon, et. al., *Exploring the Unknown, Volume I*, 381f.

eminent position we seek." Webb believed the broader United States interests in science "... demand we pursue an adequate, well-balanced space program in all areas, including those not directly related to the manned lunar landing."¹⁵⁵ Kennedy sided with Webb: there was no \$400 million supplemental: Apollo did not proceed on a "blank check" basis: and Holmes soon departed NASA. Logsdon stated, "... the president's acceptance seemed to indicate that across-the-board preeminence was indeed his guiding policy objective for the United States in space."¹⁵⁶ although the pursuit of this objective would proceed within a reasonable financial framework.

1963 Review

By 1963, Kennedy felt the need for a second review of the space program. In contrast to the 1962 review which was generated primarily by forces within NASA wanting an even higher priority for Apollo, the 1963 review "... appears to have been stimulated by increasing external criticism of the priority being given to the space program rather than other areas of science and technology, and was focused on those aspects of the program not linked to Apollo."¹⁵⁷ By 1963, many within the scientific community felt the human spaceflight program was too expensive and siphoned off resources that could be usefully employed by other scientific disciplines. Eisenhower continued to believe Apollo was a waste of resources. Finally, congressional Republicans, among others, criticized Kennedy for ignoring military space requirements.

A few examples must suffice to represent the rising chorus of criticism by 1963. Eisenhower wrote, "By all means, we must carry on our explorations in space, but I frankly do not see the need for continuing this effort as such a fantastically expensive crash program. ... why the great hurry to get to the moon and the planets? ... I think we should proceed in an orderly, scientific way, building one accomplishment on another, rather than engaging in a mad effort to win a stunt race."¹⁵⁸ A Republican

¹⁵⁵ Webb, Report for Kennedy, November 30, 1962, *Exploring the Unknown, Volume I*, 461, 465-66.

¹⁵⁶ Logsdon, "Evolution of U.S. Space Policy and Plans," 381.

¹⁵⁷ *Ibid.*, 381-382.

¹⁵⁸ Dwight D. Eisenhower, "Are We Headed in the Wrong Direction?" *Saturday Evening Post* 235 (April 11-18, 1962): 24. Eisenhower reiterated the same points in "Spending Into Trouble," *Saturday Evening Post* 236 (May 18-25, 1963): 19, asking, "But can we best maintain our over-all leadership by launching wildly into crash programs on many fronts? ... this racing to the moon, unavoidably wasting

congressman from Iowa quipped, "It would be my hope that if and when we get to the Moon, we will find a gold mine up there, because we will certainly need it."¹⁵⁹ The criticism that Kennedy neglected military space projects was seen in a January 1963 Republican Congressional Committee report: "... the Kennedy administration's failure to build up a strong military space capability is perhaps the most disastrous blunder by any government since the last World War."¹⁶⁰ Vannevar Bush, who is given credit for harnessing the scientific R&D community in service of the government in WWII, represented the opinion of many within the scientific community when he wrote Webb in April concerning the lunar landing program:

"... the program, as it has been built up, is not sound. The sad fact is that the program is more expensive than the country can now afford; its results, while interesting, are secondary to our national welfare. ... this is no time at which to make enormous - and unnecessary - expenditures. ... this program has never been evaluated objectively by an adequately informed and disinterested group, and I fear it never will be."¹⁶¹

vast sums and deepening our debt, is the wrong way to go. . ." Later in 1963 Eisenhower declared, "Anybody who would spend \$40 billion in a race to the moon for national prestige is nuts." See Stuart Loory, "Project Mercury Comes to End," *New York Herald Tribune*, June 13, 1963, p. 1. Into the Johnson administration Eisenhower continued his criticism of Apollo: "This program has been blown up all out of proportion. With hysterical fanfare our space research has been presented as a crash effort, as a 'race to the moon' between the United States and Russia which we must win at all costs. . . . We are breezily assured that the cost and dislocation brought about by this moon race are worthwhile for the new 'prestige' they will bring us" but the only sure return from a lunar voyage is that it "... will set a new record for a trip taken on borrowed money." See "Why I Am A Republican," *Saturday Evening Post* 237 (April 11-18, 1964): 19.

¹⁵⁹ H.R. Grosse, cited in Ken Hechler, *The Endless Space Frontier: A History of the House Committee on Science and Astronautics, 1959-1978*, America Astronautical Society History Series, Vol. 4 (San Diego, CA: Univelt, Inc., 1982), 124.

¹⁶⁰ Cited in Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., Publishers, 1985), 391. Representative Louis C. Wyman elaborated on Republican reasons for supporting reductions in Apollo spending and increasing military space expenditures, "A manned trip to the moon, far from being a crash program, should have a lower priority than assurance of continuing American military control of inner space. . . . If the world is to stay at peace, what it needs and what this country must have, is an American policeman in space. Not a civilian climbing a moon crater with a handful of moon dust. This can come later when we can afford it. Right now we need a manned, armed space vehicle with a hunter-killer capacity." See Minority views of Representative Louis C. Wyman, in Congress, House, Committee on Appropriations, *Independent Offices Appropriations Bill, 1964*, Report No. 824, 88th Congress, 1st Session, October 7, 1963, pp. 20, 22.

¹⁶¹ Vannevar Bush, letter to Webb, April 11, 1963, SPI document 978, pp. 2-3. Other scientists criticized NASA's emphasis on human spaceflight. Dr. Philip Abelson, editor of *Science* magazine said this overemphasis "... is having and will have direct and indirect damaging effects on a most every area

Accordingly, Kennedy asked Johnson to conduct another careful review on April 9, 1963 because he felt "... the need to obtain a clearer understanding of a number of factual and policy issues relating to the National Space Program which seem to arise repeatedly in public and other contexts." Kennedy's five specific questions included inquiries concerning: the differences between his program and Eisenhower's; principal benefits flowing from the program; major problems resulting from the space program; what reductions in the program could take place without compromising the lunar landing timetable; and was there adequate NASA-DoD coordination.¹⁶² In his capacity as NASC Chairman, Johnson gathered inputs as he had in the spring of 1961.

The State Department was critical of the continuing race posture. Its response said, "Continuing emphasis on a crash program for a manned lunar landing, particularly in the cold war context of a race with the Soviets, will strengthen the impression abroad that our program is motivated by political and security considerations. It will tend to reduce the credibility of our program as a balanced, rationally-paced undertaking for essentially scientific and beneficial purposes." The author concluded, "... by the time a manned lunar landing has been accomplished our success may well have a less advantageous impact abroad than we expect."¹⁶³ Webb, not surprisingly, disagreed and supported the current effort in space. He said the criticisms "... arise from a narrow view of the progress required to achieve the lunar goal, and a tendency to evaluate the program only in terms of immediate objectives. This attitude fails to recognize that the Apollo program is not an end in itself, but rather an initial major objective on which to focus our efforts. ... The skill and knowledge gained and the resources developed in the Apollo program will provide the basis for space power required to carry out necessary tasks in space for many years to come." Webb summarized, "The United States must demonstrate to the world its ability, as a democracy

of science and technology and ... may delay the conquest of cancer and mental illness." Cited by Lillian Levy, "Conflict in the Race for Space," in Levy, editor, *Space: Its Impact on Man and Society* (New York: W.W. Norton & Company, 1965), 205.

¹⁶² Kennedy, Memorandum for Johnson, April 9, 1963, *Exploring the Unknown, Volume I*, 467-68.

¹⁶³ Robert F. Packard, Office of International Scientific Affairs, State Department, to the Executive Secretary, National Aeronautics and Space Council, Memorandum, Subject: Presidential Memorandum of April 9, 1963, dated April 24, 1963, SPI document 972, p. 2.

and under a free enterprise system, to lead in science and technology.”¹⁶⁴ Johnson was clearly in Webb’s camp on this issue. He declared shortly before giving his official report to Kennedy, “I do not believe that this generation of Americans is willing to resign itself to going to bed each night by the light of a Communist moon.”¹⁶⁵

Johnson’s official response to Kennedy’s tasking was on May 13, 1963. He explained Eisenhower’s space program through 1970 would have cost \$17.9 billion while Kennedy’s featuring Apollo had a price of \$48.1 billion. Eisenhower’s plan was that of a “second place runner” while the Kennedy plan was designed “to make this country the assured leader before the end of the decade.” The benefits included not just prestige but also economic and national security returns. Johnson concluded no major problems would result from the space program, since it employed only 3 percent of the nation’s engineers. Johnson did not cite any portions of the NASA program amenable to reduction and he offered up no major NASA-DoD problems. His fundamental conclusion was to stay the course:

The space program is not solely a question of prestige, of advancing scientific knowledge, of economic benefit or of military development. . . . Basically, a much more fundamental issue is at stake - whether a dimension that can well dominate history for the next few centuries will be devoted to the social system of freedom or controlled by the social system of communism.

The United States has made it clear that it does not seek to “dominate” space. . . . But we cannot close our eyes as to what would happen if we permitted totalitarian systems to dominate the environment of earth itself. For this reason our space program has an overriding urgency that cannot be calculated solely in terms of industrial, scientific, or military development. The future of society is at stake.¹⁶⁶

This report is important not only because it does appear to have been Kennedy’s fundamental position for the remainder of his term but also because it represents Johnson’s thinking only six months before he would become president.

¹⁶⁴ Webb, letter to Johnson, May 3, 1963, folder: NASC meeting May 7, 1963, box 3, RG 22 - National Aeronautics and Space Council, NARA, 1, 3.

¹⁶⁵ “Johnson Doesn’t Want Red First on Moon.” *Washington Sunday Star*, May 12, 1963, p. 1.

¹⁶⁶ Johnson, memorandum for Kennedy, May 13, 1963, *Exploring the Unknown, Volume I*, 468-473.

Only five days later Kennedy declared, "I believe the United States of America is committed in this decade to be first in space."¹⁶⁷ On November 16, 1963 Kennedy toured Cape Canaveral and at one point insisted on standing directly beneath a giant Saturn rocket and asked, "Now, this will be the largest payload that man has ever put in orbit?" When told it was he replied, "That is very, very significant." In the helicopter ride back from watching a Polaris submarine missile launch, Kennedy made NASA Associate Administrator Seamans repeat the entire briefing on the Saturn and asked Seamans if the Saturn's capabilities were greater than those of the Soviet's largest rocket. When assured they were, Kennedy said, "That's very important. Now, be sure that the Press really understands this." Before exiting the helicopter Kennedy reminded Seamans, "Now, you won't forget, will you, to do this?"¹⁶⁸ Additional evidence from Kennedy's final days suggests he continued to regard the space program as a competitive race with the Soviets for worldwide prestige. As Sorensen testified, Kennedy was not ". . . deterred by a swelling chorus of dissenters at home."¹⁶⁹ Another scholar concurs, "In the end, the debate of 1963 was clearly won by the advocates of the manned lunar landing."¹⁷⁰ Robert Rosholt explained that by 1963, ". . . NASA and the space program had already gained a momentum that was not easily deflected."¹⁷¹

The day before he was murdered Kennedy declared that when the Saturn was launched the next year, it would be ". . . for the first time, the largest booster in the world, carrying into space the largest payload that any country in the world has ever sent into space. I think the United States should be a leader. A country as rich and powerful as this which bears so many burdens and responsibilities, which has so many opportunities, should be second to none. . . . This nation has tossed its cap over the wall of

¹⁶⁷ Kennedy, remarks at the Redstone Arsenal, Huntsville, AL, May 18, 1963, *Public Papers of the President, 1963*, 412.

¹⁶⁸ Oral history interview of Seamans, March 27, 1964, folder: JFK Library Interview, Seamans subseries, Deputy Administrators series, NHDRC, 43-45.

¹⁶⁹ Sorensen, *Kennedy*, 527.

¹⁷⁰ Arthur L. Levine, *The Future of the U.S. Space Program* (New York: Praeger Publishers, 1975), 89.

¹⁷¹ Robert L. Rosholt, *An Administrative History of NASA, 1958-1963*, NASA SP-4101 (Washington, DC: USGPO, 1966), 282.

space, and we have no choice but to follow it. Whatever the difficulties, they will be overcome. Whatever the hazards, they must be guarded against."¹⁷² In the speech Kennedy would have delivered in Dallas on the afternoon of November 22 Kennedy was prepared to explain. "The [space] effort is expensive - but it pays its own way, for freedom and for America. . . . There is no longer any doubt about the strength and skill of American science, American industry, American education and the American free enterprise system. In short, our national space effort represents a great gain in, and a great resource of, our national strength."¹⁷³ Finally, his speech for that evening contained this assessment of the American space effort: "We are not yet first in every field of space endeavor, but we have regained worldwide respect. . . . And we have made it clear to all that the United States of America has no intention of finishing second in outer space. . . . This is still a daring and dangerous frontier; and there are those who would prefer to turn back or to take a more timid stance. But Texans have stood their ground on embattled frontiers before, and I know you will help us see this battle through."¹⁷⁴ Even if one allows for rhetorical flourish, these hardly seem the words of a man about to pull back from a drive for pre-eminence or one preparing to abandon a competitive effort.

Kennedy, the Soviet Space Program, and a Joint Lunar Landing

One potentially puzzling sequence of events remains, however. If one holds that Kennedy's commitment to the human spaceflight for prestige equation remained firm until his final days, how does one account for his offer in September 1963 to transform the lunar landing program into a joint United States-Soviet effort? Would this not indicate a significant withdrawal from the competitive ethos? A necessary precursor to exploring this question is to survey the sequence of events during the Kennedy administration concerning cooperating in space with the Soviets as well as how offers of cooperation related to the overall American estimates of the Soviet space program and whether or not they were even in a race

¹⁷² Kennedy, Remarks in San Antonio at the Dedication of the Aerospace Medical Center, November 21, 1963, *Public Papers of the President, 1963*, p. 883.

¹⁷³ Reprinted in William J. Coughlin, "The Wall of Space," *Missiles and Rockets* (December 2, 1963): 48.

¹⁷⁴ Kennedy, Remarks Intended for Delivery to the Texas Democratic State Committee in Austin, November 22, 1963, *Public Papers of the President, 1963*, 897.

with the United States to the moon. It will be recalled from previous chapters that during the Eisenhower administration there were initiatives in this field but little progress, a factor attributed by most participants and scholars to Soviet intransigence. Much the same pattern persisted during the Kennedy administration. It is possible to point to more concrete initiatives and results from Kennedy's term, however, to include a preliminary UN agreement to ban the stationing of weapons of mass destruction in space, a precursor to the 1967 Outer Space Treaty. In addition, while there were some assertions that the Soviets had dropped out of the lunar race, Kennedy appeared to either discount them completely or at least not view them as credible enough to undermine his commitment to Apollo.¹⁷⁵

Assessing the Soviet Space Program

The CIA's input to Kennedy on the Soviet space program reinforced the competitive dynamic. Representative was NIE 11-1-62 from December 1962 which concluded the Soviets were likely to conduct "... a space program of much broader scope than in the past, but attempts to accomplish spectacular 'firsts' will continue. ... Dramatic manned space flights are likely in the course of the next few years. ... Some Soviet statements indicate that a program for a manned lunar landing is under way in the USSR ... we estimate that with a strong national effort the Soviets could accomplish a manned lunar landing in the period 1967-1969." Of vital importance to understanding Kennedy's later offer to make the lunar landing program a joint one with the Soviets is the CIA's conclusion that, from the Soviets' perspective, "... the political prestige at stake in a lunar race is likely to preclude cooperation in this area, even though it is by far the most costly of the possible new programs. The Soviets would seek a significant degree of international cooperation only if the economic burden of their space program becomes so heavy that this program or key economic and military programs were jeopardized. Under such conditions the Soviets would prefer cooperation to competing unsuccessfully or at too high a price." However, for the foreseeable future the CIA stated, "We believe that the Soviet leaders are committed to a continuing space

¹⁷⁵ John Logsdon and Alain Dupas offer a cogent and succinct examination of the Soviet lunar landing program. In it they explain that in fact the Soviet government did not give preliminary approval to a Soviet lunar landing plan until December 1964 and a final go-ahead did not come until November 1966. See Logsdon and Dupas, "Was the Race to the Moon Real?" *Scientific American* (June 1994): 20.

program of sizable proportions as an element of national power and prestige."¹⁷⁶ It seems likely that even if Kennedy genuinely desired space cooperation with the Soviets, up to and including a lunar landing, and made legitimate proposals for such joint endeavors, there had to be at least an element in his calculations cognizant of the fact that the Soviets would be extremely unlikely to accept these offers.¹⁷⁷

Therefore, when a flurry of speculation arose in 1963 that the Soviets had withdrawn from the moon race, Kennedy was skeptical. Renowned British astronomer Sir Bernard Lovell, director of Britain's Jodrell Bank Experimental Station, returned from a trip to the USSR in July 1963 and reported that the President of the Soviet Academy of Sciences, M.V. Keldysh, had told him that the USSR had rejected, for the time being, any plans for manned lunar landings due to insurmountable problems of radiation in space.¹⁷⁸ Lovell explained he had visited "all the major Soviet optical and radio observatories" and had concluded, "I don't think that there is any priority at the moment for the manned moon program - definitely not in their budget anyhow. . . . I got an astonishing impression during my visit there that the ice was rapidly cracking, and that there was a really genuine desire for cooperation."¹⁷⁹ This caused immediate and intense excitement in the press, with rampant speculation that the United States could now slow down the pace of the Apollo program and save money. However, Kennedy seemed not to take Lovell's charges seriously, stating there was still ". . . every evidence that they are carrying on a major campaign

¹⁷⁶ CIA, NIE 11-1-62, The Soviet Space Program, December 5, 1962, folder: CIA National Intelligence Estimates, box: Federal Agencies, CIA, National Intelligence Estimates, shelf: XI-B-3, NHDR, 1-3, 23-24.

¹⁷⁷ State Department intelligence information (it is unknown if it reached the presidential level or not) would have reinforced the idea that the Soviets were engaged in an active program to reach the moon. One of State's intelligence reports stated there was an American student in the USSR who was friendly with a Soviet citizen and physicist who was working on the Soviet lunar project. The physicist had told the student that "plans for the Soviet project are well advanced and that a launching should take place 'soon.'" The State Department reported stated this information could not be disseminated outside the United States government due the risk of identifying its sources. See Airgram, Amembassy Moscow, to State Department, Subject: Soviet Plans for Placing a Man on the Moon, March 22, 1963, folder: SP Space and Astronautics, USSR, box 4186, RG 59, General Records of the Department of State, Central Foreign Policy File, NARA, 1.

¹⁷⁸ Mose L. Harvey, "Preeminence in Space: Still a Critical National Issue," *Orbis* 12 (Winter 1969): 977.

¹⁷⁹ "Is U.S. Running Alone in the Race to the Moon? Interview with Sir Bernard Lovell," *US News and World Report* (August 12, 1963): 70-71.

and diverting greatly needed resources to their space effort. With that in mind, I think that we should continue . . . with our own program and go on to the moon before the end of this decade."¹⁸⁰

Shortly thereafter, Khrushchev reopened the issue by declaring at a Third World Meeting of Journalists.

We are not at present planning flights by cosmonauts to the moon. Soviet scientists are working on this problem. It is being studied as a scientific problem, and the necessary research is being done. . . . We do not want to compete with the sending of the people to the moon without careful preparation. . . . Much work will have to be done and good preparations made for a successful flight to the moon by man.¹⁸¹

These statements caused American space officials into damage control mode. NASC Executive Secretary Welsh explained, "There is nothing in Mr. Khrushchev's statement which warrants concluding that: 1. They are abandoning a lunar project; 2. They are lessening or slowing down their space program; or 3. They won't in the near future try a manned flight around the moon and back. It appears that Mr. Khrushchev has taken this means of encouraging a space slowdown in the United States and thereby trying to maintain a competitive advantage from our slower pace rather than from his speeding up."¹⁸²

The State Department corroborated Welsh's interpretation by stating what Khrushchev meant was that while the Soviets were not working on short-range, operational plans for a lunar landing they were working on the problem in general. Therefore, Khrushchev did not announce the end of the Soviet lunar program: "All told Khrushchev has committed himself to nothing."¹⁸³ This was apparently true

¹⁸⁰ Kennedy, News Conference, July 17, 1963, *Public Papers of the President, 1963*, p. 568. Given the fact that, according to Logsdon and Dupas, the Soviet government did not give preliminary approval to its lunar landing program until December 1964, two months after Khrushchev was deposed, (see above), Khrushchev's statements in October 1963 were technically correct.

¹⁸¹ Khrushchev, Address to Third World Meeting of Journalists, October 25, 1963, reprinted as an attachment to a report by NASC Executive Secretary Edward C. Welsh, Premier Khrushchev's Statement r.e. Moon Project," October 29, 1963, folder: Space Projects - Manned Lunar Landing, box 21, RG 220 - Records of the National Aeronautics and Space Council, NARA, 3.

¹⁸² NASC Executive Secretary Edward C. Welsh, Report, Premier Khrushchev's Statement r.e. Moon Project," October 29, 1963, folder: Space Projects - Manned Lunar Landing, box 21, RG 220 - Records of the National Aeronautics and Space Council, NARA, 1.

¹⁸³ State Department, Director of Intelligence and Research, Note, Khrushchev's Obscure and Noncommittal Statements About Moon Shots, November 5, 1963, folder: Space Projects - Manned Lunar Landing, box 21, RG 220 - Records of the National Aeronautics and Space Council, NARA, 1.

because Khrushchev quickly reversed himself. He told a group of visiting American businessmen, "We in the Soviet Union have never given up our goal of placing a man upon the surface of the moon at the proper time. We have never said we had given it up. This is an interpretation which the Americans have given to my statement. Again, I will say that the Soviet Union has an active program in space research with specific orientation to landing a Soviet man on the surface on the surface of the moon when the time is proper and our capabilities have been developed."¹⁸⁴ Once again, this is not a sequence of events likely to have created within the Kennedy administration the impression that the Soviets were going to accept United States offers of joint lunar landings or other space cooperation projects.¹⁸⁵ Kennedy dismissed the whole brouhaha when he said, "The fact of the matter is that the Soviets have made an intensive effort in space, and there is every indication that they are continuing and that they have the potential to continue. I would read Mr. Khrushchev's remarks very carefully. . . . I think we ought to stay with our program. I think that is the best answer to Mr. Khrushchev."¹⁸⁶

Cooperating with the Soviets in Space?

This twin discussion of intelligence information available to Kennedy on the Soviet space program and of Soviet attempts to persuade the United States that there was no moon race help set the stage

¹⁸⁴ Cited in a report by the staff of the Senate Committee on Aeronautical and Space Sciences, Khrushchev's Statement to American Businessmen, November 7, 1963, folder: Senate Committee on Space and Astronautics, 5 of 5, box 908, Clinton P. Anderson papers, LoC, 1.

¹⁸⁵ Recent scholarly evaluations of the Soviet space program tend to agree with the conclusion that the Soviets did, in fact, pursue a serious lunar landing program at least throughout the 1960s. McDougall states, "But there is enough technical evidence . . . to suggest that the Soviets were in the race for the moon despite their disclaimers after the fact." *Heavens and the Earth*, 289. In 1989 three MIT faculty members visiting the USSR stumbled upon an actual Soviet lunar lander at a technical institute in Moscow. In addition, Soviet engineers told them the Soviet spacecraft was ready to go to the moon in 1968. The *New York Times* concluded, "After years of denial by silence and misinformation, the Soviet Union has now disclosed that in the 1960s it was indeed racing the United States to be first to send men to the moon. . . . The Soviets disclosed that repeated failures of a booster rocket delayed the program and eventually caused its cancellation in the early 1970s. . . . American authorities on Soviet space activities said the disclosures were the most definitive evidence yet that there had been a 'Moon race.'" Reprinted in Seamans, *Aiming at Targets*, 323-24. Logsdon describes recently declassified information as well as testimony from 1960s-era Soviet space officials that proves ". . . the moon race was indeed real." He states that photographs and engineering descriptions of Soviet lunar hardware mean scholars have ". . . a much clearer picture of just how extensive the Soviet lunar program was." Logsdon and Dupas, "Was the Race to the Moon Real?" 16, 18.

¹⁸⁶ Kennedy, News Conference, October 31, 1963, *Public Papers of the President, 1963*, 832.

for this chapter's final topic: United States-Soviet space cooperation and Kennedy's September 1963 offer of a joint lunar program. Hopeful rhetoric concerning cooperation was present in Kennedy's speeches from his first day in office. In his Inaugural Address he said, "Let both sides seek to invoke the wonders of science instead of its terrors. Together, let us explore the stars."¹⁸⁷ Several days later in his State of the Union address he said he intended "... to explore promptly all possible areas of cooperation with the Soviet Union" to include weather satellites, communication satellites, and probes to Mars and Venus because, "Both nations would help themselves as well as other nations by removing these endeavors from the bitter and wasteful competition of the Cold War."¹⁸⁸ One perceptive scholar explains that Kennedy made these, and subsequent, offers of United States-USSR space cooperation "... knowing full well that there was little likelihood that Khrushchev would accept his offer" because if Khrushchev did "... it would tacitly be recognizing the equality of the United States in space activities."¹⁸⁹

A footnote to the Vienna summit to June 1961 was an informal Kennedy-Khrushchev exchange on a joint lunar landing program. Apparently during lunch on the first day Kennedy suggested combining the lunar landing efforts (less than two weeks after his famous May 25 speech announcing his decision). The State Department memo recorded, "With regard to the possibility of launching a man to the moon, Mr. Khrushchev said that he was cautious because of the military aspect of such flights. In response to the President's inquiry whether the United States or the USSR should go to the moon together, Mr. Khrushchev first said no, then said 'all right, why not?'"¹⁹⁰ Khrushchev's final remark was probably in jest because the next day he reversed himself:

Mr. Khrushchev said he was placing certain restraints on projects for a flight to the moon. Such an operation is very expensive and this may weaken Soviet defenses. Of course, Soviet scientists want to go to the moon, but the U.S. should go first because it is rich and then the Soviet Union will follow. In response to the President's inquiry whether perhaps

¹⁸⁷ Kennedy, Inaugural Address, January 20, 1961, *Public Papers of the President, 1961*, p. 2.

¹⁸⁸ Kennedy, State of the Union Address, January 30, 1961, *ibid.*, 26-27.

¹⁸⁹ Launius, *History of the U.S. Civil Space Program*, 58.

¹⁹⁰ State Department, Memorandum of Conversation, Vienna, June 3, 1961, in Paul L. Kesaris and Robert Lester, Project Coordinators, *President John F. Kennedy's Office Files, 1961-1963, Part I: Countries, in Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenberg, General Editor (Frederick, MD: University Publications of America, Inc., 1989), reel 24, p. 1.

a cooperative effort could be made in that direction. Mr. Khrushchev said that cooperation in outer space would be impossible as long as there was no disarmament. The reason for this is that rockets are used for both military and scientific purposes. The President said that perhaps coordination in timing of such efforts could be achieved in order to save money. . . . Mr. Khrushchev replied that might be possible but noted that so far there had been few practical uses of outer space launchings. The race was costly and was primarily for prestige purposes.¹⁹¹

Once again, the historian of these events is hard pressed to avoid the conclusion that as much as Kennedy may have hoped differently, he had to be aware of the fact that Khrushchev was not going to be receptive to American offers of large-scale cooperation throughout Kennedy's administration. One can argue if Khrushchev's reluctance was due to financial reasons, disarmament concerns, worries about military technology transfer, or because he felt the Soviets were still ahead and that by competing with the United States he would grant legitimacy to the American program. Whatever the case, the fundamental point remains: Kennedy almost certainly knew there was little chance Khrushchev could or would seriously respond to American offers of cooperative or joint space projects.

There was no reason, then, why Kennedy could not deliver pleas, such as at the UN in September 1961 that, "The new horizons of outer space must not be riven by the old bitter concepts of imperialism and sovereign claims. The cold reaches of the universe must not become the new arena of an even colder war." Kennedy also declared the United States would support any UN effort toward ". . . reserving outer space for peaceful use, [and] prohibiting weapons of mass destruction in space or on celestial bodies, and opening the mysteries and benefits of space to every nation."¹⁹² One concrete result of Kennedy's speech was that the USSR did agree to expanding the UN COPUOS to 23 members and so COPUOS had its first official meeting with a full contingent of countries on March 1962; it began work on a resolution that would ban the deployment of weapons in space.¹⁹³ This effort would culminate in one of the two concrete

¹⁹¹ State Department, Memorandum of Conversation, Vienna, June 4, 1961, in the document collection, National Security Archive, *The Berlin Crisis, 1958-1962* (Alexandria, VA: Chadwyck-Healey, Inc., 1991), document 2079, p. 1-2.

¹⁹² Kennedy, Address to the UN General Assembly, September 25, 1961, *Public Papers of the President, 1961*, 622.

¹⁹³ Arnold W. Frutkin, *International Cooperation in Space* (Englewood Cliffs, NJ: Prentice-Hall, 1965), 144.

results of the international space cooperation efforts during Kennedy's term. On October 17, 1963 the UN General Assembly adopted Resolution 1884 (XVIII), "Stationing Weapons of Mass Destruction in Outer Space." This resolution did exactly what its title implied: it prohibited the orbiting of weapons of mass destruction (nuclear, biological, chemical weapons) around the earth or on other celestial bodies such as the moon.¹⁹⁴

The second identifiable product from the international cooperation initiatives of the Kennedy era began with America's first orbital flight of a human. On February 20, 1962 John Glenn in his Mercury capsule Friendship 7 made three orbits of the earth and flew in space for 4 hours and 55 minutes. Besides making him an instant hero, it generated a congratulatory message from Khrushchev that read, "If our countries pooled their efforts . . . to master the universe, this would be very beneficial for the advance of science and would be joyfully acclaimed by all peoples who would like to see scientific achievements benefit man and not be used for 'cold war' purposes and the arms race."¹⁹⁵ Kennedy immediately responded, "I welcome your statement that our countries should cooperate in the exploration of space. . . . I am instructing the appropriate officers of this Government to prepare new and concrete proposals for immediate projects of common action. . . ."¹⁹⁶ Kennedy issued NSAM 129 instructing that NASA, the NASC, and Wiesner cooperate with the State Department in developing these proposals because ". . . the President does require that there be a prompt and energetic follow-up of his message to Chairman Khrushchev."¹⁹⁷ More important were Kennedy's private instructions to Webb, delivered through national security adviser McGeorge Bundy. Bundy wrote Webb that Kennedy ". . . knows that there are lots

¹⁹⁴ For the full text see the State Department annual publication *Documents on Disarmament, 1963* (Washington, DC: USGPO, 1964) 538f.

¹⁹⁵ Cited in David S.F. Portree, *Thirty Years Together: A Chronology of U.S.-Soviet Space Cooperation*, NASA Contractor Report 185707 (NASA, Johnson Space Center, 1993), 1.

¹⁹⁶ Kennedy letter to Khrushchev, February 22, 1962, folder: Kennedy Correspondence (NASA), box: White House, Presidents, Kennedy, May 25, 1961 speech through JFK/NASA Correspondence, NHDRC, 1.

¹⁹⁷ NSC, NSAM 129, US-USSR Cooperation in the Exploration of Space, February 23, 1962, NSA PD document 803, p. 1.

of problems in this kind of cooperation, and he knows also that you have a great head of steam in projects which we do not want to see interrupted or slowed down. At the same time, there is real political advantage for us if we can make it clear that we are forthcoming and energetic in plans for peaceful cooperation with the Soviets in this sphere." Therefore, Kennedy hoped NASA's staff could "go a little out of their way to find good projects."¹⁹⁸ The overall tone of Kennedy's instructions gives the distinct impression that he was not overly concerned with any possible cooperative projects in and of themselves (he didn't mention any specific initiatives) but rather the "real political advantage" that could be extracted from the image of a peaceful, cooperative America.

What followed was another exchange of Kennedy-Khrushchev letters and then further talks by their designated representatives, NASA Deputy Administrator Hugh Dryden and Soviet Academician and scientist Anatoly Blagonravov. Dryden and Blagonravov met nine times between March 1962 and May 1965.¹⁹⁹ The concrete cooperative actions resulting from these negotiations have best been collectively referred to as "only token results."²⁰⁰ Various levels of cooperation eventually took place in four areas: meteorological satellite systems and the exchange of their data; using the passive American communications satellite Echo II for cooperative experiments; satellites for studying and mapping the earth's magnetic field; and a joint review of information gathered in the areas of space biology and medicine. As Khrushchev freely admitted in his memoirs, the USSR simply was not interested in genuinely extensive space cooperation because this would have giving America access to Soviet space and missile technology and by doing so "... we would have been both giving away our strength [space technology] and revealing

¹⁹⁸ McGeorge Bundy, Memorandum to Webb, February 23, 1962, folder: III - National Security Council, box: White House, National Security Council, NHDRC, 1.

¹⁹⁹ For a good succinct account of the content of each meeting and the resulting agreements/memoranda of understanding see James A. Malloy, "The Dryden-Blagonravov Era of Space Cooperation, 1962-1965," *Aerospace Historian* (March 1977): 40-45.

²⁰⁰ Foy D. Kohler, American Ambassador to the USSR, in his "Foreword: An Overview of US-Soviet Space Relations," to Dodd L. Harvey and Linda C. Ciccoritti, *U.S.-Soviet Cooperation in Space* (Miami, FL: Monographs in International Affairs, Center for Advanced International Studies, 1974), xxiv.

our weakness [lagging ICBM development]. . . ."²⁰¹ Congress concluded. "Khrushchev seemed to be concerned less with cooperating in space than with making a concrete political reality of the abstract Soviet claim that a shift in the balance of world power against the West had occurred, and that this was attributed, among other factors, to Communist superiority."²⁰²

NASA's Director of International Programs emphasized that the assorted projects and data exchanges resulting from the Dryden-Blagonravov talks in the early and mid-1960s provided for coordination and not integration. ". . . a kind of arm's length cooperation in which each side carries out independently its portion of an arrangement without entering into the other's planning, design, production, operations, or analysis. No classified or sensitive data is exchanged. No equipment is to be provided by either side to the other. No funds are to be provided by either side to the other."²⁰³ Kennedy himself wrote Representative Albert Thomas in September 1963 and explained, "Our repeated offers of cooperation with the Soviet Union have so far produced only limited responses and results."²⁰⁴ Given this limited progress by 1963 in developing concrete United States-Soviet space cooperation, it seems unlikely Kennedy concluded he had much to lose by offering Khrushchev a joint lunar landing effort; Khrushchev would almost certainly reject the proposal.

In the summer of 1963 simply making such a grand proposal, and during an address to the UN General Assembly, had distinct appeal to Kennedy. After the Cuban missile crisis in October 1962 there had been at least some thawing in United States-Soviet relations. Some even spoke of a nascent détente. The clearest piece of evidence was that after United States-USSR talks for a complete banning of nuclear

²⁰¹ Nikita Khrushchev, *Khrushchev Remembers: The Last Testament* (Boston: Little, Brown, 1974), 54.

²⁰² Legislative Reference Service, for the Congress, Senate, Committee on Aeronautical and Space Sciences, *Soviet Space Programs: 1962-1965*, Report, 89th Congress, 2nd Session, December 1966, p. 62-63.

²⁰³ Frutkin, 100-101.

²⁰⁴ Kennedy, letter to Representative Albert Thomas, September 23, 1963, reprinted in Congress, House, Committee on Appropriations, *Independent Offices Appropriations Bill, 1964*, Report No. 824, 88th Congress, 1st Session, October 7, 1963, pp. 950. McDougall's quip is appropriate: "The Dryden-Blagonravov negotiations have been described more often than their results warrant." *Heavens and the Earth*, 516 note 28.

tests had failed, the countries did work out a Limited Test Ban Treaty (LTBT) in July 1963 which banned the testing of nuclear weapons in space, the atmosphere, and under water.²⁰⁵ As movement within the UN framework toward a resolution banning the stationing of weapons of mass destruction in outer space gained steam (see above) Kennedy may very well have seen the offer of a joint lunar landing as one which would provide America with an even brighter image as a peaceful nation enthusiastically embracing all types of disarmament and weapons control. As Sorensen recalled, Kennedy "... did not think it possible to achieve in his administration a sweeping settlement of East-West divisions. But he did hope that small breakthroughs could lead to larger ones, and that brick by brick a détente could be built, a breathing space, a 'truce to terror' in which both sides could recognize that mutual accommodation was preferable to mutual annihilation."²⁰⁶

Accordingly, when Kennedy spoke to the UN on September 20, 1963 he indirectly referred to the Cuban missile crisis when he said "... the clouds have lifted a little so that new rays of hope can break through." Kennedy pointed to the LTBT, the easing of tensions over Berlin, and resolution of the Congo and Laos crises as evidence of the fact that "We meet today in an atmosphere of rising hope." Kennedy offered several proposals for maintaining and augmenting the momentum towards peace and said,

I include among these possibilities a joint expedition to the moon. Space offers no problems of sovereignty. . . . Why, therefore, should man's first flight to the moon be a matter of national competition? Why should the United States and the Soviet Union, in preparing for such expeditions, become involved in immense duplications of research, construction, and expenditure? Surely we should explore whether the scientists and astronauts of our two countries . . . cannot work together in the conquest of space, sending some day in this decade to the moon not the representatives of a single nation, but the representatives of all of our countries.²⁰⁷

²⁰⁵ For text and details see State Department, *Documents on Disarmament, 1963*, supra, 291-93. The treaty was initialed by United States, Soviet, and British representatives on August 5, 1962. The United States Senate ratified the treaty by a vote of 80-19 on September 24, 1963. Smaller testimonials to a growing Soviet-American thawing in 1963 were the "Hot Line" agreement of June 20, 1963 establishing a direct communications link between Moscow and Washington, the commencement of the sale of \$250 million of surplus American wheat to the USSR, and the initiation of negotiations to begin direct air service between New York and Moscow and to open new consulates in both countries. See any one of a number of sources for these developments such as Firestone, 38ff or Gaddis, *Russia, the Soviet Union, and the United States*, 244ff.

²⁰⁶ Sorensen, *Kennedy*, 517.

²⁰⁷ Kennedy, Address Before the 18th General Assembly of the United Nations, September 20, 1963, *Public Papers of the President, 1963*, pp. 693, 695.

Taken at face value, Kennedy's speech would certainly appear to have been a legitimate, good-faith offer for a joint lunar landing program. But making a legitimate, good-faith offer is not mutually exclusive with holding out little realistic hope that a positive response to that offer will be forthcoming. The evidence in the case of Kennedy's joint lunar landing offer appears to support the interpretation that while Kennedy may very well have not been acting or speaking disingenuously, he also may not have been at all optimistic, based upon past Soviet/Khrushchev behavior, that his offer would be taken seriously, much less elicit a favorable response. Analysts should remember Kennedy's statement earlier that summer in the midst of the Lovell episode: "The kind of cooperative effort which would be required for the Soviet Union and the United States together to go to the moon would require a breaking down of many barriers of suspicion and distrust and hostility which exist between the Communist world and ourselves. There is no evidence as yet that those barriers will come down. . . . I would welcome it, but I don't see it as yet, unfortunately."²⁰⁸

Nevertheless, the historian must also avoid dismissing entirely Kennedy's sincerity in making his September 1963 offer. Only ten days before his assassination he signed NSAM 271, "Cooperation with the USSR on Outer Space Matters." In it Kennedy addressed Webb:

I would like you to assume personally the initiative and central responsibility within the government for the development of a program of substantive cooperation with the Soviet Union in the field of outer space, including the development of specific technical proposals. . . . These proposals should be developed with a view to their possible discussion with the Soviet Union as a direct outcome of my September 20 proposal for broader cooperation between the United States and the USSR in outer space.²⁰⁹

²⁰⁸ Kennedy, News Conference, July 17, 1963, *Public Papers of the Presidents, 1963*, pp. 567-68. At any rate, the United States never received any kind of Soviet reply to Kennedy's September 1963 joint lunar landing offer.

²⁰⁹ NSAM 271, Cooperation with the USSR on Outer Space Matters, November 12, 1963, NSA PD document 1026, p. 1. Webb's final response to NSAM 271 of course had to be delivered to Johnson. On January 28, 1964 he wrote Johnson to suggest four potential areas of American-Soviet cooperation. These were projects for the determination of: micrometeoroid density in space between earth and moon; radiation and energetic particle environment between earth and moon; character of the lunar surface; and selection of lunar landing sites. See Webb, Letter to the President, January 28, 1964, RG 200, Records of the National Aeronautics and Space Council, box 23, tab 4, p. 1.

A formal presidential NSAM is more than a continuing wish. Kennedy clearly wanted his administration to press forward with the exploration of potential United States-Soviet Union cooperative space projects. Quite possibly the only sure statement the analyst can make is that the tensions that had been present within Kennedy's space policy from the beginning of his presidency between racing competitively for prestige in space and cooperating internationally in space continued until his death.²¹⁰

It is possible that Kennedy found himself almost whipsawed between conflicting advisers within his administration. On the one hand Johnson and Webb seemed inclined to support as low a level of cooperation with the USSR as possible. On the other hand elements within the State Department and Arms Control and Disarmament Agency, represented by individuals such as national security adviser McGeorge Bundy, wanted to achieve as much space cooperation with the Soviets as quickly as possible. NSAM 271 may represent the continuing ambivalence within Kennedy's mind as to which pursuit was paramount: competition or cooperation. Perhaps near the end of his presidency, the proponents of cooperation had the upper hand, given the tenor of NSAM 271. Whatever the case, and absent additional evidence, one can safely state that no firm resolution or conclusion is possible; the ambivalence in Kennedy's space policy continued throughout his tenure. Janus continued to gaze in both directions.

This bi-directional space policy orientation in one sense reflected the continued ambivalence one finds in Kennedy's overall cold war policy. For instance, one must balance the indications of détente and Kennedy's inspiring American University speech of June 1963 with other cold war statements he made *after* that address. In Berlin Kennedy declared, "Ich bin ein Berliner . . . There are many people in the world who really don't understand, or say they don't what is the great issue between the free world and the Communist world. Let them come to Berlin. . . . Freedom has many difficulties and democracy is not perfect, but we have never had to put up a wall to keep our people in. . . . the wall is the most obvious and vivid demonstration of the failures of the Communist system [and] an offense not against history but an offense against humanity."²¹¹ Addressing NATO headquarters a week later he stated, "Communism has

²¹⁰ I am indebted to Professor John Logsdon of the Space Policy Institute of George Washington University for his thoughts concerning Kennedy's posture toward space cooperation with the USSR contained in this paragraph and the next.

sometimes succeeded as a scavenger but never as a leader. It has never come to power in any country that was not disrupted by war, internal repression or both. . . . They [Communists] cannot look with confidence on a world of diversity and free choice, where order replaces chaos and progress drives out poverty." Kennedy said the increasing strains within the Communist bloc ". . . make it increasingly clear that this system, with all its repression of men and nations, is outmoded and doomed to failure."²¹²

One returns again to the image of Janus looking in both directions. Kennedy's cold war policy and his space policy considered as a subset of it were clearly an amalgam of "accommodative and confrontational policies" because "Kennedy was, above all, a pragmatist who viewed the Cold War . . . as a conflict of interests rather than of ideologies."²¹³ For him there was not necessarily any conflict in signing an atmospheric and space nuclear test ban and continuing to test underground, or in being willing to sell the Soviets surplus wheat while refusing to sell them strategic, defense-oriented items or even in exploring the possibilities of disarmament while maintaining a stockpile of arms. Kennedy's cold war policy, with the space program clearly a part of it, ". . . was marked by heterogeneous features: on the one hand, an obsession not to appear soft on the Soviets and a distinct preoccupation with conveying a tough and virile image; and, on the other hand, a penchant for stressing the common interests brought about by the 'dark forces of destruction' unleashed by science."²¹⁴ Kennedy himself said, "Let us always make clear our willingness to talk, if talk will help, and our readiness to fight, if fight we must. . . . When we think of peace in this country, let us think of both our capacity to deter aggression and our goal of true disarmament."²¹⁵

²¹¹ Kennedy, Remarks in the Rudolph Wilde Platz, June 26, 1963, *Public Papers of the President, 1963*, pp. 524-25.

²¹² Kennedy, Remarks in Naples at NATO/HQ, July 2, 1963, *ibid.*, 551.

²¹³ Firestone, 60-61.

²¹⁴ Erik Beukel, *American Perceptions of the Soviet Union as a Nuclear Adversary* (London and New York: Pinter Publishers, 1989), 37.

²¹⁵ Kennedy, Address at the University of Maine, October 19, 1963, *Public Papers of the Presidents, 1963*, 796-97.

A final point concerning Kennedy's joint lunar landing proposal of September 1963 bears mentioning. Whether or not Kennedy believed the suggestion was likely to elicit an affirmative response from the USSR, the very fact that he made the offer seems to have cost Apollo a measure of Congressional support. At the same time Kennedy was making the offer he was asking that NASA's FY64 budget be approved at the level of \$5.7 billion. However, on October 10, 1963 the House voted 125-110 to forbid spending any federal funds for "participating in a manned lunar landing to be carried out jointly by the United States and any Communist-controlled, or Communist-dominated country." The House language would force the President to seek special approval for any part of the space program used in a joint lunar exploration program. In addition, Congress was beginning the appropriations process that would result, as described earlier in this chapter, in the reduction of Kennedy's NASA budget request by \$600 million to \$5.1 billion.²¹⁶ A Republican Congressmen explained the cut as resulting from the fact that the Russians were focusing on earth orbital space in their space program, not the lunar environment and because of "... the President's suggestion made recently before the world that lunar programs in technology, operation and objective be shared with the Soviet Union. . . . The mere fact that the President has suggested such a possibility infects the entire Apollo program with fiscal uncertainty."²¹⁷ At a minimum from this point forward in the realm of forging space policy, "Congress could no longer be taken for granted."²¹⁸ Given this adverse Congressional reaction, it was unlikely Lyndon Johnson would, during his presidency, risk any of his political capital (rapidly being depleted by the Vietnam war) on bold propositions for United States-Soviet space cooperation. In fact he did not. United States-Soviet space cooperation during the Johnson administration was simply the continuation of the Kennedy-era initiatives, specifically the decreasingly fruitful Dryden-Blagonravov talks and transforming the UN Resolution banning weapons in space into the Outer Space Treaty in 1967.

²¹⁶ Cited in Stuart H. Loory, "House Rebuffs Kennedy's U.S.-Red Moon Trip in Limiting Space Funds," *New York Herald Tribune*, October 11, 1963, p. 1.

²¹⁷ Minority views of Representative Louis C. Wyman, in Congress, House, Committee on Appropriations, *Independent Offices Appropriations Bill, 1964*, supra, 22.

²¹⁸ Lambright, *Powering Apollo*, 121.

Logsdon provides the most important conclusion for this chapter. He summarizes, "In terms of its political underpinnings, it is more appropriate to place the Apollo decision in the 1950's than in the 1960's. Apollo was one of the last major political acts of the Cold War: the moon project was chosen as a symbol of the head-to-head global competition with the Soviet Union." As a symbolic undertaking Apollo was "... intended to demonstrate to the world that the United States remained the leading nation in technical and social vitality. Almost equally important, though not as clearly articulated, Kennedy saw Apollo as a means of restoring American pride and self-confidence, which appeared to have been badly damaged by the Soviet Union's surprising demonstration of technological and strategic strength through its series of space firsts." The foundation for Kennedy's space policy was the simple fact that as a political leader Kennedy "... found unacceptable the notion of the United States taking second place to the Soviet Union in a critical area of human activity." The contrast with the Eisenhower administration could not be starker. Overall, "Kennedy himself was much more interested in the political payoff of Apollo than he was in the across-the-board acceleration of the space program, but he had little choice but to approve the whole package. . . ." ²¹⁹ Harvey Brooks points out another aspect of the Apollo decision that Kennedy found appealing: Apollo provided a highly visible and easily understandable demonstration of American technological prowess "... without directly threatening the USSR or raising public fears of a military confrontation. It was like a challenge between the champions of two medieval armies, the race for the moon serving as a partial surrogate for more threatening forms of competition." ²²⁰

Another analyst makes the telling point that, "In a very real sense, the final U.S. response to the Sputnik challenge was not complete until Neil Armstrong and Buzz Aldrin walked upon the Sea of Tranquillity on 20 July 1969. . . . the moon race completely overshadowed all other U.S. space activities such

²¹⁹ John Logsdon, "The Apollo Decision in Historical Perspective," in Richard P. Hallion, editor, *Apollo: Ten Years Since Tranquillity Base* (Washington, DC: Smithsonian Institution Press, 1979), 4-5.

²²⁰ Harvey Brooks, "Motivations for the Space Program: Past and Future," in Allan A. Needell, *The First 25 Years in Space* (Washington, DC: Smithsonian Institution Press, 1983), 10.

as the continuing attempts of the Air Force to build a manned military space mission."²²¹ The next chapter will detail the institutional climate that developed between the DoD and NASA during the Kennedy administration, to include the crucial factor of tension within the DoD between the OSD and the corps of Air Force space enthusiasts.

²²¹ Peter L. Hays. *Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War* (Ph.D. dissertation. Fletcher School of Law and Diplomacy, Tufts University, 1994), 173.

7. Institutional Concerns: NASA, DoD, McNamara, and the Air Force Under Kennedy

There is a growing expertise in cost-effectiveness analysis as it applies to military space systems and a firmly seated conviction that to merit support, space programs must compete favorably when weighed impartially against other feasible alternatives in the context of overall military needs for the present and the future.¹

There is no clear requirement, in my mind, at the present time, for manned military operations in space.²

No one in his senses would propose building a complete space-weapons system today. The state of the art is just not that advanced - we're about where we were in aviation in 1910. But we do know, thought we can't prove it, that space power will be as important as air power. And we also know, thought we can't prove that either, that man will be as important in space as in the air.³

Despite rumors to the contrary, the space race is between the U.S. and the USSR; not between NASA and the USAF.⁴

When one views the NASA-DOD relationship of this period in an agency-wide sense, one sees an overall picture of mutual support and concerted effort in the best national interest - a strong desire on the part of each Agency to assist the other to discharge its assigned functions and to achieve its goals.⁵

An account of the NASA-DoD relationship for the Kennedy administration must begin during the election campaign and interregnum period in which many believe the Air Force was waging a

¹ DoD chapter in, Executive Office of the President, *U.S. Aeronautics and Space Activities, 1963*, Report to the Congress from the President of the United States, January 27, 1964, NSA MUS document 329, p. 39.

² Secretary of Defense Robert S. McNamara, February 1963, cited by Ben Price, "Nation Ruling Space Rules Every Nation," *New York Herald Tribune*, June 16, 1963, p. 1.

³ General Bernard A. Schriever, Commander, Air Force Systems Command, cited by Stewart Alsop, "Outer Space: The Next Battlefield," *Saturday Evening Post* 235 (July 28-August 4, 1962): 18.

⁴ Edward C. Welsh, Memorandum to the Vice President, Military vs. Non-Military Space Activities, January 19, 1963, folder: Defense 1963, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA, 2.

⁵ W. Fred Boone, *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32 (Washington, DC: USGPO, 1970). iii.

"campaign" of its own to secure more responsibility in the space program, almost certainly at the expense of NASA. This chapter will examine that observation and then move into a discussion of the climate within the DoD itself that was so important to how the DoD related to NASA. Finally, the chapter will close with a look at the specifics of support, coordination, and rivalry that continued to characterize the NASA-DoD relationship from 1961-1963.

An Air Force Campaign to Usurp NASA Responsibility?

The Gardner Committee

Evidence presented to support the existence of an Air Force campaign to expand its space responsibilities falls into three categories: the Gardner study group; speeches; and internal documents. Together these supposedly comprised an intra-USAF and a public relations offensive designed to convince the incoming Kennedy administration and the Congress that the Air Force had the institutional capabilities required for, and therefore should be awarded, a greater role in space. The Trevor Gardner study committee was an effort Schriever established on October 11, 1960. Gardner had been an energetic and dynamic Special Assistant for Research and Development to the Air Force from February 1953 to February 1955, during which time he was the driving force behind the Air Force push to accelerate the ICBM effort. He then served as the USAF's first Assistant Secretary for R&D but resigned in February 1956 because he felt the Eisenhower administration was not devoting adequate resources to the ICBM crash effort.⁶

He maintained close contacts with the service's space and missile community and Schriever asked him in October 1960 "... to review current ARDC space development objectives and resources and to recommend a program which would enable the Air Force to effectively meet its development responsibilities in space in the 1960-1970 time period."⁷ Schriever told his boss, CSAF Thomas White, that the purpose of the Gardner Committee was to "... recommend a space development program for the USAF

⁶ For the complete story see Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Center for Air Force History, 1990), 103ff.

⁷ Trevor Gardner, Chairman, *Report of the Air Force Space Study Committee*, March 21, 1961, SPI document 1525, p. i.

which would extend as far as practicable into the future and which would be designed to provide the nation with a significant military space capability by mid-1965 and thereby advance the national prestige."⁸ Schriever wrote Glennan to reassure him that the Air Force had no designs on taking over NASA, that the report was designed for internal Air Force planning uses (he provided Glennan with a copy of his tasking letter to Gardner, cited above), and emphasized that if the committee made any recommendations in areas "clearly scientific or commercial in nature" such recommendations would be highlighted in the report so they could be dealt with by the appropriate agency. Finally, Schriever pledged, "You may be assured that a copy of this document [the committee's final report, when it was available] will be made available to NASA."⁹ While the committee did not release its report until late March 1961, it was generally known that the Air Force was making some kind of internal assessment as to its future space plans and many assumed NASA was thereby threatened.

As it turned out, the Gardner Committee's report when released in March had no great impact because DDR&E Harold Brown "... just gave it short shrift. Nothing ever came of it."¹⁰ In the 64-page report neither NASA's institutional existence nor its specific missions in space were directly challenged. On the other hand, NASA was also scarcely mentioned. The report did lament, "Our insistence on classifying space activities as either 'military' or 'peaceful' has exposed us to unnecessary international political problems. . . . The Air Force must improve its organization and procedures so that its actions in this new field of endeavor will reflect a full understanding of these complex facts, particularly as they relate to other agencies and governments. . . . National security considerations alone justify a major increase in the

⁸ Schriever, letter to Thomas White, October 20, 1960, folder: 2-6, ARDC, box 33, Thomas White papers, LoC, 1.

⁹ Schriever, letter to Glennan, January 11, 1961, folder: Glennan (Select Correspondence), Glennan subseries, Administrators series, NHDRC, 1.

¹⁰ Oral history interview of Schriever by the author, July 2, 1996. In another context, Schriever said the report was simply "put on the shelf." See Schriever, "Comments," in Allan A. Needell, *The First 25 Years in Space* (Washington, DC: Smithsonian Institution Press, 1983), 28. Secretary of the Air Force Eugene Zuckert confirmed, stating, "I thought the program was much too ambitious" as presented in the committee's final report. See oral history interview of Eugene Zuckert, July 25, 1964, from *The John F. Kennedy Presidential Oral History Collection, Part I: The White House and Executive Departments*, microfilmed from the holdings of the John F. Kennedy Library (Frederick, MD: University Publications of America, 1988), reel 12, p. 127.

Department of Defense space effort. . . . Unless we meet the Soviet challenge with a dramatically invigorated space program, our international prestige will be further damaged."¹¹ Such nebulous statements neither indicting NASA directly nor stating the Air Force should take it over but yet ignoring NASA while criticizing the current state of affairs continued throughout the report: "While the role that the Air Force is to play in the U.S. exploration of space is not yet determined, both past experience and existing resources indicate that this role should be a major one, and should be established in the near future. . . . the Air Force should take the lead in improving our international position resulting from space actions, plans and events."¹² The Air Force should have foreseen the public relations danger inherent in statements such as:

The challenge of the unknown and of the unoccupied will make manned space exploration inevitable - first in orbit, then of the moon and afterwards of the planets. The Department of Defense, through the Air Force, should prepare to play a major role in this difficult exploration. The Air Force should urgently develop the fundamental capability to place and sustain man in orbit. . . . It is essential that the Air Force play a major support role in manned exploration of the moon and planets.¹³

Speeches and Briefings

A Schriever speech of November 21, 1960 represents the oratorical component of the campaign. Schriever began with the standard Air Force line, "For the first time in the history of our Nation, we are open to a destructive nuclear surprise attack." As part of deterring such an attack, ". . . the importance of satellites and other space systems as essential elements of our military strength is not fully appreciated." However, Schriever then specifically *denied* that the United States should have a single, unified, space program and pointedly called for close cooperation between the civilian and military space programs so that facilities could be used to their fullest. He elaborated that there was a clear divergence between the DoD's and NASA's space roles: the DoD's was to exploit space for the security and survival of the United States while NASA's was to investigate space for scientific and other peaceful purposes. Therefore the two organizations would require different types and numbers of space systems and vehicles: in the

¹¹ *Report of the Air Force Space Study Committee*, supra, 4, 6.

¹² *Ibid.*, 7, 14.

¹³ *Ibid.*, 27, 32.

next decade DoD would require larger numbers of vehicles for its defensive missions than NASA would for its scientific exploration. In addition the military vehicles would require longer life and higher reliability, simple operational and maintenance procedures, and have the ability to be quickly launched.¹⁴

Where Schriever caused alarm bells to ring was when he emphasized the Air Force's current capabilities in space. He explained, "Within the USAF there exists a great array of facilities capability of projecting the Air Force into the aerospace age." The Air Force's Ballistic Missile Division "... constitutes the greatest single collection of space age managers in the free world." Together with the USAF's rocket testing laboratories and launch facilities, its tracking stations and satellite test centers, its scientific laboratories and its bioastronautics laboratories, the Air Force's facilities were a valuable national asset: "I haven't mentioned all of the Air Force facilities for space nor even all of those which we have in ARDC oriented toward that vast arena. . . . the Air Force has the resources for the space age."¹⁵ In no way did Schriever directly compare the AF's capabilities to NASA's. Conversely, he also did not mention NASA's contributions to America's space infrastructure.

Internal Documents

The internal document universally pointed to as evidence of an Air Force campaign was the *Air Force Information Policy Letter for Commanders* for December 1960. This was used by the Air Force to explain to its leaders what current Air Force policy was on particular issues and give the commanders guidance in establishing local policies, composing speeches, etc. The four-page December 1960 edition was subtitled "Air Force Competency in Space Operations" and concluded both Nixon and Kennedy had displayed "... a realization at the highest levels of our Government that military supremacy in space is as essential to our security as military supremacy at altitudes near Earth." The pamphlet continued,

Because of its assigned responsibilities, the Air Force has devoted its efforts, funds and dedication almost exclusively to aerospace operations from its earliest flights beyond man's natural environment. . . . For the Air Force to make note of its competency in aerospace operations is not to take credit from the other military Services. Their

¹⁴ Schriever as Commander, ARDC, speech before the Allegheny Conference on Community Development, Pittsburgh, PA, November 21, 1960, inserted into the *Congressional Record*, January 6, 1961, Appendix, A-93 - A-94, by Representative James Fulton, a vocal supporter of all increasing both military and civilian space spending.

¹⁵ Ibid., A-94.

assigned responsibilities to the American people lie elsewhere, primarily, and are equally indispensable. . .

During the past 20 years the broadest base for current U.S. programs in aerospace has been largely developed by the Air Force - plus the aerospace industry, research institutions, and Government agencies, such as NACA and NASA, which have helped make the Air Force the world's leading aerospace arm. The know-how and facilities that have sprung from this military effort are a national resource of immeasurable value not only to Free World survival, but to scientific and technological advances for the welfare of mankind From its start, NASA's Project Mercury has been nourished by Air Force aerospace medical skills and people.

The newsletter went on to describe in detail the assorted Air Force space vehicles, launchers, facilities, and installations giving the Air Force the ". . . unparalleled competency to assume an even more stronger supporting role in gaining and maintaining general aerospace supremacy for our nation."¹⁶ Again, the letter did not have an overtly imperialistic or hegemonic quality to it. On the other hand, like Schriever's speech, it did not discuss NASA's facilities and capabilities, nor did it give a sense of perspective concerning what the Air Force was doing in space and what NASA did in space; NASA was essentially ignored. This *Policy Letter* reflected, in a general sense, the briefings that the Air Force was giving to congressmen and representatives of the aerospace industry.

The Press Weighed In

The Schriever-type speeches and the policy letter-type documents were enough to send the press into a frenzy of speculation, long before the March release of the Gardner report. *Aviation Week* confidently declared four days after the *Policy Letter*'s release:

The Air Force is preparing a major political offensive to bring about changes in national space policy and law that would let it proceed with detailed, specific plans for space weapons involving 'tens of thousands, perhaps hundreds of thousands' of satellites in orbit in the next 15 years [as described] in the latest of a continuing series of technical briefings to industry leaders and groups within the service. . . . Not only does Air Force expect to invade a province of NASA by proposing manned space vehicles and large booster development, but it intends to enter the communications satellite area, now monitored by the Army.¹⁷

¹⁶ USAF, "Air Force Competency in Space Operations," *Air Force Information Policy Letter for Commanders*, Volume XIV, Number 17, December 1, 1960, folder: NASA-USAF Policy Relations, Other Agency Agreements subseries, Federal Agencies series, NHDRC, 1-3.

¹⁷ Larry Booda, "Air Force Outlines Broad Space Plans," *Aviation Week* (December 5, 1960): 26.

The venerable *New York Times* picked up on this and added.

The Air Force has drafted a publicity offensive to stake out a major role for itself in the nation's space program. The offensive is clearly keyed to the change in administrations. It is the openly expressed belief of the Air Force that the Kennedy administration will look more favorably upon military operations in space than does the Eisenhower administration. . . . The [*Air Force Information Policy*] letter serves to point up the probability of a major battle between the military services and between the Defense Department and the National Aeronautics and Space Administration over which agency should play the major role in the space program.¹⁸

The *Policy Letter*, in fact said absolutely nothing about the "probability" of any kind of institutional battle. John Finney wrote this *Times* article and covered aerospace affairs for that newspaper. He later told Seamans why he rarely wrote anything non-controversial or even positive about either NASA or the Air Force space programs: "OK, I write a good article and if I'm lucky it will be on page 33. If I write something controversial, I have a chance of getting it on page 1. It's as simple as that. I'm paid by what page I get my articles on."¹⁹

One cannot, of course, completely dismiss assertions of an Air Force campaign as media fabrications. There was, at a minimum, concern within NASA's congressional patrons, the House and Senate space committees, that something was afoot. Kenneth BeLieu was Staff Director for the Senate Committee on Aeronautical and Space Sciences, chaired by Vice President-elect Johnson, and wrote Johnson in December 1960, "The Air Force can be expected - and apparently already has started - to make a basic power play to grab the entire Space program. This would involve eliminating NASA. . . . The Air Force would have the entire aerospace industry behind it."²⁰ Five days later he added the Air Force ". . . really wants responsibility for the entire program, to do away with NASA as it is now known, and relegate it to a simple advisory role (similar to what the old NACA had). The Air Force would have the entire aerospace

¹⁸ John W. Finney, "Air Force Seeks Top Role in Space: Drafts Publicity Offensive Keyed to the Change in Administrations," *New York Times*, December 11, 1960, p. 68.

¹⁹ Recounted in Robert C. Seamans Jr., *Aiming at Targets* (Beverly, MA: Memoirs Unlimited, 1994), 123. Publication by NASA of a modified version forthcoming as part of the NASA History Series.

²⁰ Kenneth BeLieu, Memorandum for Lyndon Johnson, Governmental Organization for Space Activities, December 17, 1960, folder: NASC 1960-1961, box: White House, National Aeronautics and Space Council, NHDRC, 3.

industry behind it unless it is divided and conquered by the proper Executive level management. This can be done."²¹

Outgoing DDR&E York was evidently concerned enough to inquire from the Secretary of the Air Force what was going on with these speeches, briefings to industry, etc. The acting Secretary of the Air Force replied, "The philosophy underlying the briefings was to present systems, concepts, and studies to industry. Many of the topics were not presented as approved programs or as authorized." The purpose of the Air Force presentations to the aerospace industry was ". . . to give industry the benefit of AFBMD thinking about possible courses of missile and space research and development in the future. . . . It is Air Force policy to give this type of briefing to industry rather than have industry attempt to predict future Air Force research and development efforts on incomplete and fragmentary information." Furthermore, "It has become evident that the Air Force program of study requirements is especially susceptible to misunderstanding [because] enthusiasm on the part of industry and the press frequently describes these requirements out of context. The Air Force is determined to minimize such occurrences."²²

Resolution

By February 1961 the Air Force had suffered enough adverse publicity from these accusations of waging a campaign, and was attracting enough unwanted attention from high-level civilian leaders, that it stated in another *Policy Letter for Commanders* that

From NASA's beginning, in 1958, Air Force-NASA cooperation has been close and mutually beneficial. . . . The Air Force agrees with NASA that there should be a clear realization, both in this country and throughout the world, that the United States has a single space exploration program administered by NASA; and that activities in the space environment related to national defense devolve from the responsibilities of the Defense Department for the defense of the Nation, and clearly must be managed by the Department of Defense. Air Force activity in space projects is devoted solely to the latter. . . . Although each agency has a different sphere of responsibility, both NASA and the Air Force contribute to each other's program.²³

²¹ BeLieu, Memorandum to Johnson, December 22, 1960, *ibid.*, 2.

²² Acting Secretary of the Air Force Lyle S. Garlock, letter to DDR&E Herbert York, January 12, 1961, folder: USAF Docs/Correspondence (1957-61), DoD subseries, Federal Agencies series, NHDRC, 1.

²³ USAF, "NASA-USAF Cooperation," *Air Force Information Policy Letter for Commanders*, February 1, 1961, volume XV, Number 3, folder: USAF Space - AFCHO, DoD subseries, Federal Agencies series, NHDRC, p. 1.

The flap over an Air Force campaign steadily died down from this point forward, not only due to these Air Force pledges of cooperation with NASA but because it became absolutely clear that Congress would not tolerate any significant alteration in the division of space responsibilities. Seamans recalls voicing his concerns over NASA's general situation and especially the possibility that the Air Force might take over part of NASA's programs to NASA General Counsel Johnny Johnson early in 1961. Seamans asked, "Do you suppose they're even thinking of absorbing NASA back into the Department of Defense?" Johnson's perceptive reply was that, "There is no chance. The political situation would never permit. . . . They may be thinking about it, but if they should try, they won't get away with it" because Congress would never permit it.²⁴ NASA's General Counsel's point was that, "You've got to realize the strength of the committees. I just don't believe that since NASA has its own authorization committees that Congress will ever stand for this."²⁵

By mid-February Webb was also on board as NASA Administrator and could not only boost NASA morale but exercise his political skills on NASA's behalf against any Air Force initiatives. Webb later explained that the Air Force never had any chance of expanding its space responsibilities into, for instance, the lunar exploration area because of powerful members of the space committees such as Overton Brooks in the House and Robert Kerr in the Senate. Webb said the Air Force ". . . could fuss for it [more space responsibility]. They could get the newspapers saying they ought to have it. But the power structure was not oriented so that they could prevail. I was perfectly happy for them to float around, and make the noise, and make the bids. I knew where the power was, and where the votes lay, so I wasn't bothered by that. . . . And you notice I never bothered to answer. . . . But I was still in very close touch with the people who held the balance of power" in Congress.²⁶ On the very day he was nominated, CSAF

²⁴ Oral history interview of Seamans, July 5, 1996, by the author; and November 2, 1987, NASM.

²⁵ Seamans citing Johnny Johnson, oral history interview, May 8, 1968, Seamans subseries, Deputy Administrators series, NHDRC, 19.

²⁶ Oral history interview of James Webb, April 11, 1974, James Webb file, box: Emme/Roland interviews on early NASA history, shelf: V-A-1, NHDRC, 42-43.

Thomas White wrote Webb, "Contrary to some published reports, the Air Force and NASA have enjoyed a very close and cooperative relationship. We in the Air Force will do our utmost to maintain this cooperative spirit. . . ."²⁷ Additional documentary evidence bears out Webb's assessment of the fundamental political situation.

The key figure in the rest of the correspondence related to assessing the Air Force "campaign" was Representative Overton Brooks, Chairman of the House Committee on Science and Astronautics (hereafter referred to as the House space committee). He zealously guarded NASA's responsibilities against any encroachment. When the USAF's top officer heard Brooks was concerned about supposed Air Force moves to gain increased responsibility at NASA's expense, the CSAF wrote Brooks, "I can assure you that any action or statements by any Air Force individual or groups which tend to create such impressions are in direct contradiction to the established beliefs and policies of the Air Force." General White stressed ". . . the excellent spirit of teamwork that characterizes the cooperation between that agency and the Air Force. This attitude has not changed and, in fact, our close cooperation with NASA at both the policy and working levels has never been stronger than it is today." White closed by asking Brooks for any help Brooks could offer in ". . . specifically identifying the 'pressure groups within the USAF' to which you refer and the specific actions taken by these groups toward 'degrading the position of NASA.'"²⁸

²⁷ Thomas White, letter to Webb, January 31, 1961, folder: Webb nomination, Webb subseries, Administrators series, NHDRC, 1.

²⁸ CSAF Thomas White, letter to Overton Brooks, January 19, 1961, IRIS 1002992, AFHSO, 1. White was citing from a letter Brooks had written him expressing Brooks' concerns. White was apparently quite forthcoming in his desire to help. Shortly after leaving NASA, Glennan wrote White, "Believe me, Tommy, I appreciate the attention you have given to the matter of counteracting the 'propaganda' that is being published in various of the newspapers and magazines about difficulties between the Air Force and NASA. . . . I appreciate, more than I can say, your attitude in this matter. . . . I shall remember the friendly and genuine cooperation which you provided to me at every turn of the road during my tour of duty in Washington." This letter strengthens the conclusion that if there was some sort of an Air Force "campaign," it was being waged by lower echelon generals in the Air Force who could be categorized as space enthusiasts and did not have any official sanction at the Air Staff level, which is the Air Force's top-ranking generals who establish official USAF policy. See Glennan, letter to White, January 27, 1961, folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas White papers, LoC, 1.

Outgoing NASA Administrator Glennan also attempted to persuade Brooks there was no grand conspiracy taking place to undermine NASA. He wrote Brooks shortly after White did in January 1961 to emphasize, "Surely, in the early days of NASA, much strain and competition was in evidence. However, with the great assistance of Secretary Gates [Defense], Secretary Douglas [Air Force], and General White, I believe there has been eliminated from the scene the sort of competition which is destructive in nature. Arguments there will be, but these are now conducted with good will on both sides. . . ." White pointed out, "It is unfortunate, indeed, that certain elements in the trade press seem determined to stir up animosity between NASA, the Air Force and the DoD. In recent conversations with General White and Secretary Sharpe [Dudley, Secretary of the Air Force], there was agreement that no significant differences existed between the NASA and the Air Force."²⁹

Brooks was not mollified by either Glennan's or White's reassurances. He wrote Glennan in mid-February that he was happy with the private assurance of Glennan and White that all was well but, "I have been waiting with great interest for a public renunciation of these charges. Although both you and General White have given me private assurances in this matter, neither the U.S. Air Force nor NASA has specifically attempted to set the public record straight. . . . I am concerned about the 'end runs' which tend to circumvent the spirit of the agreements which constitute the foundation for the operation of the AACB."³⁰ Top Air Force leadership appeared to be at a loss at this point as to how to placate Brooks. One internal Air Force internal memo could only conclude, "There is no 'power struggle' afoot!. . . It is possible that someone is giving Mr. Brooks some faulty advice which has the net effect of keeping alive an erroneous public impression of NASA-Air Force waste, duplication, and unhealthy competition. It is interesting to note that both NASA and Air Force informally have agreed that not only is there no waste or duplication, but that the national interest demands the application of further resources to the U.S. national space effort."³¹ Chief of Staff White could only resolve to meet with new Administrator Webb, along with

²⁹ Glennan, letter to Overton Brooks, January 27, 1961, folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas White papers, LoC, 1.

³⁰ Brooks, letter to Glennan, February 14, 1961, IRIS 1002992, AFHSO, 1.

³¹ Lieutenant General Roscoe C. Wilson, Deputy CSAF for Development, internal memorandum, Response to Mr. Brooks, dated only March 1961, IRIS 1002992, AFHSO, 1-2.

Dryden and Seamans, to try to “. . . determine how we may, with finality, lay the ghost of this alleged NASA-Air Force dissension and duplication to rest. . . . the first order of business is to get Congressman Brooks on our side.”³²

Apparently Brooks was in such a state that only direct word from the President would reassure him that NASA was not imperiled. Therefore he wrote Kennedy on March 9, 1961:

I am seriously disturbed by the persistence and strength of implications reaching me to the effect that a radical change in our national space policy is contemplated within some areas of the executive branch. In essence, it is implied that United States policy should be revised to accentuate the military uses of space at the expense of the civilian and peaceful uses. . . . the voluminous rash of such reports appearing in the press, and particularly in the military and trade journals, is, it seems to me, indicative that more than mere rumor is involved.

Brooks said he was the “last person to attempt to weaken our defense posture. But neither do I intend to sit by and, contrary to the express intent of Congress, watch the military tail undertake to wage the space dog.” Brooks’ primary concern was that, “If NASA’s role is in any way diminished in favor of a space research program conducted by a single military service, it seems unlikely to me that we shall ever overtake our Soviet competition.”³³

Kennedy’s reply made his position crystal clear: “It is not now, nor has it ever been, my intention to subordinate the activities in space of the National Aeronautics and Space Administration to those of the Department of Defense. I believe, as you do, that there are legitimate missions in space for which the military services should assume responsibility, but that there are major missions, such as the . . . application of space technology to the conduct of peaceful activities, which should be carried forward by our civilian agency.” Since Brooks and others had pointed to some portions of the Wiesner Report (see chapter 6) as supposedly supporting a greater DoD role in space, Kennedy cleared the air: “I have been as-

³² Thomas White, letter to Glennan, March 21, 1961, reprinted in *Briefing Book for Air Force witnesses before the House Committee on Science and Astronautics on the Subject of DOD Space Directive 5160.32*, K160.8636-4, AFHSO, 1961.

³³ Overton Brooks, letter to John Kennedy, March 9, 1961, reprinted in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 315-17.

sured by Dr. Wiesner that it was not the intention of his space task force to recommend the restriction of the NASA to the area of scientific research in space."³⁴ If the speculation of an Air Force takeover had begun to dwindle during February with the Air Force's official denial, then in March and April it quickly faded after Kennedy's letter. After Kennedy's lunar landing speech on May 25, 1961 announcing that NASA would be the agency primarily responsible for this ambitious goal, the whole question virtually disappeared. As one participant in the lunar landing decision deliberations recalled when asked if there was ever any discussion of *not* having NASA manage the effort, "There was never the slightest. . . ."³⁵

Throughout the rest of his presidency, it appears JFK only addressed the NASA-DoD balance of power issue one other time. In a June 14, 1962 press conference he was asked if there were any plans for a major realignment of the American space program to give the military a bigger role (Finney in the *New York Times* had just published a series of speculating this was the case). Kennedy responded, "The military have an important and significant role, though the primary responsibility is held by NASA and is primarily peace, and I think that the proportion of that mix should continue."³⁶ Kennedy seemed quite convinced even before his lunar landing decision that the fundamental NASA-DoD division of effort was appropriate. After giving NASA responsibility for Project Apollo, the central element of Kennedy's expanded space effort, there was even less of a chance he or the congressional space committees would permit any fundamental alternation in the managerial responsibilities of the American space program.

Several conclusions emerge from this sequence of events associated with charges of an Air Force campaign for a heightened space role. First, if one accepts the evidence that proponents of such an offensive offer as proof, it must naturally follow that the campaign was waged *not* by the highest civilian or uniformed levels of the Air Force but by the cadre of space enthusiasts, headed by Schriever. The correspondence between White and Glennan clearly indicates they had an amiable personal relationship and

³⁴ John Kennedy, letter to Overton Brooks, March 23, 1961, reprinted in *ibid.*, 317.

³⁵ Oral history interview of Willis Shapley, Military Division, BoB, December 14, 1967, by John Logsdon, file: Willis Shapley, Biographical series, NHDRC, 26.

³⁶ Kennedy, News Conference, June 14, 1962, *Public Papers of the Presidents, 1962* (Washington, DC: USGPO, 1963), 495.

were puzzled as to why there was such concern over the NASA-DoD relationship. Second, the evidence offered as supporting the campaign notion is itself open to divergent interpretations: it contains no overt references to taking over NASA as an institution or any of its programs. If one does extract subtleties of bureaucratic hegemony from the speeches and *Air Force Information Policy Letters*, it is done by reading between the lines and imputing what the Air Force meant by *not* discussing NASA as part of America's space program.

Third, at most any such campaign did not go beyond speeches to civic groups and briefings to the aerospace industry. The worst light in which Air Force actions could reasonably be interpreted is that they consisted of a clumsy, ill-timed, and poorly-executed public relations effort. Any attempt by the Air Force to take substantial action encroaching on NASA's territory would have been firmly resisted by a coalition of NASA's dynamic new leader Webb, the congressional space committees, Kennedy, and possibly McNamara, who may have viewed a healthy and powerful NASA as a way to check the power of an overly ambitious Air Force.³⁷ As will be seen below, Webb quickly formed agreements with McNamara on assorted questions of the NASA-DoD relationship, effectively countering any Air Force moves. Fourth, even if one assumes a powerful Air Force move to take over NASA, once Kennedy awarded NASA the lunar landing mission, any such campaign had no chance of success and quickly would have died. As Logsdon concludes, "It is unlikely that the Kennedy administration could have, or would have, agreed to the Air Force demands for a larger space role at the expense of NASA."³⁸ Another team of scholars concurred, "The so-called 'military-industrial complex' had failed, if indeed it had ever tried, to reduce NASA."³⁹

The discussion of the Kennedy era NASA-DoD relationship can fortunately now move from the realm of speculation and conjecture into areas in which more concrete historical evidence is available.

³⁷ According to W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 90f.

³⁸ John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass. and London, England: The MIT Press, 1970), 79.

³⁹ Loyd S. Swenson Jr., James M. Grimwood, Charles C. Alexander, *This New Ocean: A History of Project Mercury*, NASA SP-4201 (Washington, DC: USGPO, 1966), 338.

The central preliminary question is in fact quite complex. By 1961 what did the Air Force as an institution believe about its role in space? Did the civilian leadership such as Secretary of the Air Force Eugene Zuckert concur? What kind of reception did the Air Force position receive in the OSD now headed by McNamara? Finally, how do the answers to these questions play into the NASA-DoD relationship? Such is the task for the remainder of this chapter.

DoD Directive 5160.32

The Air Force believed it detected a hopeful sign concerning McNamara's stance on military space when he issued DoD Directive 5160.32, Development of Space Systems, on March 6, 1961. With this decree, McNamara consolidated the USAF's role in the military space realm. He declared that while each military service could conduct undefined "preliminary research to develop new ways of using space technology" all space technology proposals beyond "preliminary research" had to be submitted to the DDR&E for consideration and eventual Secretary of Defense approval. Then, "Research, development, test, and engineering of Department of Defense space development programs or projects, which are approved hereafter, will be the responsibility of the Department of the Air Force." Only the Secretary of Defense could make exceptions to the assigning of space developmental responsibilities to the Air Force and only then "in unusual circumstances."⁴⁰ In effect, this directive "... made the Air Force the DOD executive agent for all space development programs, regardless of service of ultimate use. It enabled the Air Force to determine the shape of space developments to best suit its own requirements."⁴¹ In addition, it effectively ended the interservice competition for space once and for all; the only programs remaining outside the Air Force were the Navy's Transit navigation satellite and the Army's Advent communication satellite.⁴²

⁴⁰ DOD Directive 5160.32, Development of Space Systems, March 6, 1961, reprinted in Logsdon, et. al., *Exploring the Unknown, Volume II*, supra, 314-15.

⁴¹ Richard I. Wolf, *The United States Air Force Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, 1987), 361.

⁴² However, McNamara's cover letter to the Directive made clear it did not automatically predetermine the assignment of operational responsibility for each and every space system to the Air Force. He said operational responsibility of a particular space system would be done project by project and "... will take into account the competence and experience of each of the services and the unified and specified

The origins of this directive that consolidated Air Force control of DoD space projects apparently were found in a review McNamara ordered of the military space program after the Wiesner Report called it "fractionated." He assigned the review to his new Office of Organization and Management Planning Studies, which quickly discovered the Air Force was already responsible for over 90 percent of the DoD's space R&D and in the remaining 10 percent it still provided the boosters and launch facilities.⁴³ Schriever recalled that at that point Deputy Secretary of Defense Roswell Gilpatric approached him and said, "Look, General, you straighten out the situation between ARDC and AMC [Air Materiel Command] and we'll direct that the space research and development and space activity within the Department of Defense be assigned to the Air Force."⁴⁴ Schriever assigned the task of creating a new intra-AF organizational structure for space activities to a small working group which prepared, coordinated, and obtained the necessary approval to create a new Air Force Systems Command, commanded by Schriever, which would combine the old ARDC and AMC. The new Systems Command had responsibility for the R&D, design, testing, procurement, and delivery to the operational commands of every weapon system in the Air Force to include space systems.⁴⁵ The new command and Schriever as its commander were the key players in the Air Force and military space program for the remainder of the Kennedy and Johnson administrations, although Schriever retired in 1966.

While the Air Force chose to emphasize the aspects of the directive that centralized its control of the military space R&D realm, the more important clauses were the ones granting the DDR&E and Secre-

commands." McNamara cover letter to DoD Directive 5160.32, March 6, 1961, folder: Defense, 1961, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

⁴³ Testimony of Roswell Gilpatric, in House, Committee on Science and Astronautics, *Defense Space Interests*, Hearings, 87th Congress, 1st Session, March 1961, p. 11-12.

⁴⁴ Oral history interview of Schriever, June 20, 1973, K239.0512-676, AFHRA, 27-28. AMC and ARDC often fought intense bureaucratic battles within the Air Force over questions of which command would be responsible for R&D, design, testing, procurement, and delivery of a particular weapon system. CSAF White corroborated Schriever's account: "He [White] had been told by Secretary Zuckert that the Deputy Secretary of Defense, Mr. Roswell L. Gilpatric, had offered the military space mission to the Air Force, provided it 'put its house in order.'" AFSC, *The Genesis of the Air Force Systems Command*, Historical Publication 62-102260, 1962, I-30.

⁴⁵ See *The Genesis of the Air Force Systems Command* for the complete history, *ibid.* AFSC had four divisions: Space Systems, Aeronautical Systems, Ballistic Systems, and Electronic Systems.

tary of Defense final approval authority for all space projects. McNamara's key watchdog within the DoD for waste and duplication emphasized that the real reason for the directive was to prevent interservice conflicts and to centralize OSD control over Air Force space proposals "... by further restructuring the independent freedom of action of the three military services ... [and] by limiting the latitude of the military departments to increase emphasis and funding for various projects."⁴⁶ McNamara would use the DDR&E as a strong staff arm to exercise firm control over all Air Force space proposals during his tenure. The Air Force could do very little developmental work on any space system without explicit DDR&E approval. Therefore, the best assessment of DoD Directive 5160.32 was provided by Zuckert who said that in fact it "... was solely jurisdictional. It just gave us jurisdiction in the space field. There was the question of how much support we would get. ... It was like getting a franchise to run a bus line in the Sahara desert."⁴⁷ Zuckert's point, borne out by future events, was that just as a franchise to traverse the Sahara is basically meaningless due to the lack of traffic demand, so would be the responsibility for space R&D if McNamara and his DDR&E Harold Brown refused to sanction such work. The Air Force actually had very little freedom of independent action as a result of the directive: the OSD through the DDR&E would exercise tight control over USAF activities.

The fundamental clash that developed turned out to be not between NASA and the Air Force or DoD but in fact between the Air Force and the OSD. The Air Force's grand plans for putting humans in space and extending the American deterrent shield into space were repeatedly quashed by McNamara, DDR&E Harold Brown and Brown's deputy John Rubel. The key link to the NASA-DoD relationship is that not only did the OSD insist that Air Force space proposals offer a definite and identifiable increase in American security, but they also had to not duplicate in any way NASA's work in space R&D. If NASA was working on a project that could possibly fulfill the requirements of a system the Air Force was proposing, then the OSD would almost certainly reject the Air Force proposal and order a cooperative venture

⁴⁶ Assistant Secretary of Defense, Comptroller Charles Hitch, testimony in *Defense Space Interests*, *supra*, 82.

⁴⁷ Oral history interview of Zuckert, July 25, 1964, *supra*, 125.

with NASA. Therefore, an accurate portrayal of the NASA-DoD institutional relationship should more precisely be characterized as the NASA-OSD-USAF relationship. It will be necessary first to examine what the space community within the Air Force felt was the proper role for the military in space. Next, what did McNamara and the OSD conclude concerning the military in space? Finally, what sorts of tensions arose due to clashing interpretations and how did this begin to feed into the NASA-OSD-USAF relationship?

The Air Force's Philosophy and Space Plan

High-ranking Air Force officers often emphasized the important role they perceived the new domain of space playing in national security. When he retired on June 30, 1961 Chief of Staff White remarked, "I make this prediction, in the future the people who control space will control the world." His replacement as the Air Force's top officer, Curtis LeMay, stated, "A nation that has maneuverable space vehicles [a reference to Dynasoar] and revolutionary armaments can indeed control the world. For peace or for aggression."⁴⁸ The most enthusiastic space officers such as Schriever continued to believe an artificial distinction between "peaceful" and "military" activities in space inhibited the Air Force's ability to operate in the space medium. Schriever's complaint was not with NASA as an institution but rather the policy and philosophy behind the creation of NASA. He told a Senate committee in July 1961, when asked if the military space program was being adequately and properly supported, "No sir, I think we have been inhibited in the space business through the 'space for peace' slogan. I think that there has been too arbitrary a division made between the Department of Defense and NASA in this area . . . when in fact no technical and little other distinction between the two exists." Schriever recommended that ". . . the sense of urgency that exists across the whole front of space projects should be injected into the manned military space program . . . if the artificial division between peaceful and military space programs is removed" then the United States could surpass the Soviet Union."⁴⁹

⁴⁸ Both men cited by Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, volume II* (Maxwell AFB, AL: Air University Press, 1989), 215.

⁴⁹ Schriever testimony to the Senate Preparedness Investigations Subcommittee, July 1961, cited in Carl Berger, *The Air Force in Space, Fiscal Year 1962* (Washington, DC: USAF HDLO, June 1966), 3-6.

The Air Force Space Plan of 1961

The clearest expression of Air Force sentiments in the Kennedy administration was the Air Force's first, and only, full-blown Space Plan, released in September 1961. In this 88-page document the USAF detailed exactly what it believed it should do in space, what programs were required, and what these would cost. The Air Force Space Plan explicitly stated, "The prestige value of spectacular achievements, such as has been enjoyed by the Soviets, is recognized as having significant importance in the cold war struggle between two opposing ideologies." In any American effort to respond, "It is appropriate that the Air Force become completely involved in, and carry a major share of, this effort. . . . Whereas the Air Force strongly advocates an aggressive military space program, it recognizes that to arbitrarily separate military from nonmilitary space-development responsibilities is fundamentally unsound. The capabilities and facilities of the Air Force will be used to support the entire National Space Program, not just the distinctively military portions."⁵⁰

The Air Force pledged full support of NASA's lunar landing effort: "The lunar program will provide valuable data for military activities in space. It is expected that the civil and military efforts in space programs during the next decade will continue to complement each other. . . . The Air Force will provide the fullest possible support to the lunar program." But the USAF also emphasized the threat the Soviet space program posed: "It is clear that the Soviets have the technical capabilities to develop a serious military space threat to the nation. The Air Force believes that these growing technical capabilities will be developed into a threat." Therefore, there existed ". . . the definite possibility of a surprise action which could result in Soviet military dominance of space."⁵¹

The bulk of the Air Force's Space Plan went on to detail the specific missions and systems it believed America required to ensure the Soviets could not pose a threat from space. Throughout the document the Air Force emphasized the role humans had to play in space systems: "Man is unique in his ability to make on-the-spot judgments. He can discriminate and select from among alternatives which have

⁵⁰ USAF, Air Force Space Plan, September 1961, SPI unnumbered document, 1, 3, 7.

⁵¹ Ibid., 7, 11, 13.

not been anticipated. He is unusually adaptable to rapidly changing situations. Thus, his inclusion in military space systems, if feasible, can be expected to increase significantly their flexibility as well as the probability of mission success." For instance, the Air Force believed the satellite inspection and neutralization would be performed by a manned system, Dynasoar.⁵² The anticipated Air Force space program included everything from the development of rendezvous, docking, and reentry techniques to "a permanent, manned, military test space station [for] evaluating operational concepts and hardware possibilities for: space command posts; permanent space surveillance stations; space resupply bases; permanent orbital weapon-delivery platforms; subsystems and components."⁵³ The Air Force even called for a space shuttle to be the next vehicle constructed beyond Dynasoar, in 1965, and used as a space station resupply vehicle.⁵⁴ Deputy CSAF for Research and Development Lieutenant General James Ferguson told Congress that implementation of the Air Force Space Plan would require increasing FY63 funding from OSD's programmed \$826 million to \$1.3 billion and FY64 from \$1.3 billion allocated by OSD to \$1.86 billion.⁵⁵

In his public advocacy for the Air Force Space Plan and the accompanying increased funding, General Schriever apparently went too far. In an October 11, 1961 speech to the American Rocket Society Schriever remarked, "I have been, am being, and, if the situation is not changed, will continue to be inhibited if our space efforts continue to be carried out under an unnecessary, self-imposed national restriction; namely, the artificial division between space for peaceful purposes and space for military purposes."⁵⁶ This generated a pointed memo from McNamara to Secretary of the Air Force Zuckert: "Gene,

⁵² Ibid., 21-22, 27.

⁵³ Ibid., 37.

⁵⁴ Ibid., 40, 44.

⁵⁵ Ferguson to the House, *DoD Appropriations, 1963*, Committee on Appropriations, Subcommittee on DoD Appropriations, Hearings, 87th Congress, 2nd Session, part 2, pp. 476-77. Cited in Berger, *Air Force in Space, FY62*, 20.

⁵⁶ Cited in NASA, *Aeronautical and Astronautical Events of 1961* (Washington, DC: USGPO, 1962), 54.

If such statements were made, they seem inappropriate. What do you plan to do?"⁵⁷ Zuckert reminded Schriever, "It must be clear that Air Force people do not publicly complain about Government decisions. in this case the assignment of space development responsibilities to a special agency created for that purpose." Zuckert said Air Force spokesmen must "... avoid giving the impression in the public press that the Air Force is 'shackled,' or 'inhibited,' or not getting adequate support from NASA."⁵⁸ Zuckert later commented that Schriever's speech "... didn't make the President very happy either"⁵⁹ and that, "I chewed him [Schriever] out about that speech because Jim Webb complained to me and we gradually worked things out."⁶⁰ Two days after Schriever's speech Vice President Johnson made one of his own in which he was careful to explain, "The future of this country and the welfare of the free world depend upon our success in space. There is no room in this country for any but a fully cooperative, urgently motivated all-out effort toward space leadership. No one person, no one company, no one Government agency, has a monopoly on the competence, the missions, or the requirements for the space program. It is and must continue to be a national job."⁶¹

Two factors seem to have deflated any Air Force effort, through its Space Plan, to increase its space budget. First, on February 20, 1962 John Glenn became the first American to orbit the earth. One analyst said, "A great feeling of relief and euphoria swept the nation as the feat brought an outpouring of international acclaim and good will to the United States, not only for the achievement itself, but for the public manner in which it had been conducted." Any interest that may have existed within Congress for expanding the Air Force space program in accordance with the USAF's new Space Plan quickly dissipated.⁶² Second, the OSD was not in late 1961 or early 1962 amenable to Air Force requests for greater

⁵⁷ McNamara, Memorandum to Eugene Zuckert, undated but probably October 14 or 15, 1961, 168.7050-54, AFHRA, 1. Declassified at author's request.

⁵⁸ Zuckert, Memorandum to Schriever, undated but sometime after October 19, 1961, 168.7050-54, AFHRA, 1. Declassified at author's request.

⁵⁹ Oral history interview of Zuckert, July 25, 1964, from *The John F. Kennedy Presidential Oral History Collection, Part I*, supra, reel 12, p. 128.

⁶⁰ Series of oral history interviews of Zuckert, December 1986, K239.0512-1763, AFHRA, 42.

⁶¹ Cited in *Aeronautical and Astronautical Events of 1961*, 54.

space funding. When the Air Force did request an immediate \$400 million supplemental for the FY63 budget to begin implementing its Space Plan, DDR&E Brown informed CSAF LeMay on August 20, 1962 that it would be difficult "... to justify any blanket increase in funding for space programs at this time."⁶³ This would be a standard response from the OSD throughout the Kennedy administration. Zuckert made a point to emphasize, "The National Aeronautics and Space Administration has a massive program to acquire a capability to operate in space. The Air Force is supporting it to the limit of our abilities. We need what NASA will learn. Necessarily, the Air Force also has space programs of its own. . . ."⁶⁴

1962 and Beyond

The space enthusiasts within the Air Force continued to desire a larger Air Force role in space but as the Kennedy administration continued it became increasingly clear this was not likely, given the close supervision OSD exercised over Air Force space initiatives. After the situation described above with the Air Force 1961 Space Plan, future Air Force space planning documents were not publicized, nor was there any effort to garner congressional support for them. By the next year, 1962, the OSD's firm managerial control ensured there would be no replays of the events subsequent to the release of the 1961 plan. For instance, by October 1962, the Air Force had completed a revision of its 1961 Space Plan. It reiterated the two purposes of the Air Force in space: "To enhance the general military posture of the United States through military use of space;" and, "To provide a military patrol capability within the space region." Together the systems that would provide these capabilities would deny to any hostile power "... the uninhibited military exploitation of space, and to provide a system of protection for U.S. scientific activities in space." The revised plan continued to call for: better space boosters; space weaponry; devel-

⁶² Gerald T. Cantwell, *The Air Force-NASA Relationship in Space, 1958-1968* (Washington, DC: Department of the Air Force, Office of Air Force History, October 1971, reprinted November 1990), 32.

⁶³ Berger, *Air Force in Space*, FY62, 24.

⁶⁴ Zuckert, "The Secretary of the Air Force Speaks on Space Programs," *Air Force Information Policy Letter for Commanders*, vol. XVI, No. 2, January 15, 1962, Other Agency Agreements subseries, Federal Agencies series, NHDRC, p. 4.

opment of reliable rendezvous, docking, and transfer procedures; and maneuverable re-entry and precision recovery.⁶⁵

LeMay's case to Zuckert to support the revised Space Plan of 1962 included figures to demonstrate the increasing discrepancy between what Air Force officers felt was required for a proper military role in space and what the OSD was permitting. The Plan's proposed military space expenditures compared to DoD's budgeting baseline for space were, in millions of dollars:⁶⁶

Year:	1963	1964	1965	1966	1967
USAF:	1210	1995	2410	2398	2302
DoD:	919	992	857	776	688

These figures illustrate the gulf in thinking between the Air Force and the OSD; the Air Force was planning for a space program over three times what the OSD seemed willing to authorize. As an official Air Force history explains, "Unfortunately, the five-year program - which served the useful function of crystallizing Air Force thinking on its space goals - made no great impact upon OSD. McNamara for all practical purposes ignored the document." Deputy DDR&E John Rubel's response "... was very discouraging" as he indicated in a late October 1962 meeting that the plan would receive little support in the OSD because OSD had concluded the plan failed to justify the requirement for proposed programs.⁶⁷ In a speech that month Rubel declared that the level of DoD space spending was "... as close to the optimum size as we can make it in the light of all the uncertainties that must accompany such a program. In fact, we probably err on the side of allowing too generous a margin of safety for the effects of these uncertainties. Henceforth the DoD would emphasize hard military requirements and that proposals which served abstract doctrines about the military role in space would not be entertained."⁶⁸

⁶⁵ LeMay, letter to Zuckert, serving as a cover for the revised Air Force Five Year Space Plan, October 19, 1962, folder: 6 - 1962, Box B128, Curtis LeMay papers, LoC, 1-3.

⁶⁶ Ibid., 4.

⁶⁷ Gerald T. Cantwell, *The Air Force in Space, Fiscal Year 1963* (Washington, DC: USAF HDLO, December 1966), 7. Declassified at author's request.

⁶⁸ Reprinted in Congress, House, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)* Thirteenth Report, 89th Cong. 1st Session, House Report No. 445, June 4, 1965, pp. 77-78.

The OSD's Perspective

McNamara stated clearly, concisely, and often the criteria an Air Force space proposal would have to meet before he would even consider approving it: "First it must mesh with the efforts of the National Aeronautics and Space Administration in all vital areas. We must ensure that the Defense and NASA programs, taken together, constitute an integrated national program, and that knowledge and information flow freely between the two. Second, projects supported by the Defense Department must promise, insofar as possible, to enhance our military power and effectiveness."⁶⁹ If there was even a hint of possible duplication with any on-going NASA program, the Air Force would have an extremely difficult time justifying a project to the OSD. If the Air Force could not show quantifiably and specifically exactly how the proposed space project was able to enhance military power and effectiveness, then once again, OSD approval was extremely unlikely. Behind these criteria there was an oft-expressed OSD skepticism concerning the necessity for military officers in space and for any increased military space budget. DDR&E Brown's Deputy Rubel had day-to-day responsibility for monitoring the military space program. Rubel summarized in October 1962, "Our expenditures on space developments have been remarkably high in relation to viable concepts for military applications in space. In fact, despite extraordinary efforts we have not evolved any very new ideas for military applications in space during the past several years. This is especially true of manned military applications."⁷⁰

OSD termed its overall orientation to the military space question the "building block" approach. In it the DoD divided military space into two broad areas. First were those missions currently deemed viable and able to support present DoD requirements such as robotic satellites for meteorology, navigation, geodesy, communications, and early warning against ballistic missile attack. These military space pro-

⁶⁹ McNamara, Statement Before the Senate Armed Services Committee on the FY 1964-68 Defense Program, January 21, 1963, folder: Statement to Congress r.e. 1964 budget, box 22, RG 200, Robert McNamara papers, NARA, 134. One of numerous other examples of McNamara making this statement is Congress, House, Committee on Armed Services, *Military Posture*, Hearings, 88th Congress, 1st Session, 1963, p. 483. McNamara made this same statement in numerous other instances of congressional testimony but the substance was always the same.

⁷⁰ Rubel, speech on military space, October 9, 1962, released as DOD News Release No. 1642-62, DOD Office of Public Affairs, John Rubel file, Biographical series, NHDRC, 1.

grams would be “. . . integrated with the over-all military program, supplementing or complementing other military activities.”⁷¹ The second category were certain developments in basic technology, “. . . the building blocks necessary for a flexible capability to move rapidly into systems needed in the future as specific defense requirements and missions are defined. These building blocks include structures, guidance and control systems, maneuverable re-entry vehicles, propulsion, and man himself.”⁷² The OSD tended to regard these potential future building blocks as an insurance policy against a Soviet surprise in the use of space for military purposes. DDR&E Brown explained, “At this point in time it is difficult to define accurately the specific characteristics that future military operational systems of many kinds ought to have. We must, therefore, engage in a broad program covering basic building blocks which will develop technological capabilities to meet many possible contingencies. In this way we will provide necessary insurance against military surprise in space by advancing our knowledge on a systematic basis so as to permit the shortest possible time lag in undertaking full scale development programs as specific needs are identified.”⁷³ Brown obliquely referred to Dynasoar when he gave the example of rendezvousing with a satellite and returning to earth as a building block capability being worked on: “Again, while a firm military requirement for all such systems does not now exist, we are following the ‘building block’ approach. . . .”⁷⁴

In both categories of military space projects, the immediately feasible and useful ones integrated into current DoD capabilities, and the longer term building block efforts, the OSD emphasized the fact that the Kennedy administration viewed the United States space program as a single, unified effort, some portions of which NASA was responsible for and the DoD for others. This stands in contrast to the Eis-

⁷¹ From the DoD subsection of, Executive Office of the President, *U.S. Aeronautics and Space Activities, 1961*, Message to the Congress from the President of the United States, January 31, 1962, NSA MUS document 326, p. 33.

⁷² Ibid.

⁷³ Statement by DDR&E Brown to the Senate Committee on Aeronautical and Space Sciences, June 14, 1962, reprinted in USAF, *Air Force Information Policy Letter, Supplement for Commanders, Special Issue: Military Mission in Space, 1957-1962*, Director of Information, Office of the Secretary of the Air Force, dated only 1962, folder: DOD Space Policy, DoD subseries, Federal Agencies series, NHDRC, 1.

⁷⁴ Ibid.

enhower administration which attempted to amend the Space Act, stating such a single, unified program was not possible and the effort to create it resulted in confusion. The DoD's chapter in the Kennedy administration's report on its first year of space activities stated, "Because the NASA programs help make our country stronger in many fields of science and technology, the DOD and NASA operate in close accord at management and operating levels to insure that the collective efforts are complementary." The report pointed to the AACB as one example of the efforts "... to ensure close working relationships and to effect integration of DOD and NASA effort essential to the prosecution of a single national program. ... In the national interest, it is mandatory that all resources be effectively used in the conduct of the National Space Program. The DOD and the NASA have continuously planned their respective efforts on a joint basis."⁷⁵

McNamara's Management Philosophy and Systems Analysis

A short discussion of McNamara's underlying management philosophy that compelled him to enforce efficiency, consolidation, and the elimination of duplication from all DoD programs, the military space program included, is necessary to fully understand the NASA-DoD relationship. McNamara's quest for cost reduction and single, efficient programs guaranteed that if NASA had some kind of a program (such as Gemini) exploring a particular capability (such as rendezvous and docking in space), it was extremely unlikely that McNamara would approve a DoD program exploring those same capabilities (Dynasoar), even if Dynasoar was also going to explore other capabilities.

McNamara later wrote that one of his core conclusions about leading the DoD was "... that the dynamics of efficient management in so complex an institution as the Defense Department necessarily require the use of modern managerial tools and increasing efforts to determine whether the 'cost' of each program and each new project is justified by the 'benefit' or strength it adds to our security." He described himself as the type of Secretary of Defense who was a real leader who "... immerses himself in his operation, leads and stimulates an examination of the objectives, the problems and the alternatives"

⁷⁵ *U.S. Aeronautics and Space Activities, 1961*. Message to the Congress from the President of the United States, supra, 33-34, 41.

and not just a judge who "... waits until subordinates bring him problems for solution, or alternatives for choice." His diagnosis of the Pentagon's main problem was that not that the Secretary of Defense lacked authority but rather "the absence of the essential management tools needed to make sound decisions." McNamara then began "... applying strict standards of effectiveness and efficiency to the way we spend our Defense dollars. . . . These reforms would necessarily change traditional ways of doing things, and limit the customary ways of spending Defense money."⁷⁶

McNamara believed the primary problem was that in the past "... the three military departments had been establishing their requirements independently of each other. The results could be described fairly as chaotic." For instance, the Army planned for a long war of attrition and therefore stockpiled months and sometimes years of supplies while the Air Force assumed future conflicts would be short nuclear exchanges and so maintained only a few days of supplies. McNamara therefore insisted the DoD budget "... for the first time grouped together for planning purposes units which must fight together in the event of war." So the Navy's Polaris submarine and the USAF's bombers and ICBMs would be compared with and evaluated in terms of each other, not in terms of other intra-service priorities: which would be most cost efficient in destroying Soviet targets? What was true within the DoD would, in the case of military space, also be true for the Air Force in relation to NASA: the Air Force space proposals would be judged not only in terms of what they could add to America's deterrent, but also in terms of whether or not they duplicated NASA capabilities. McNamara emphasized, "Adding a weapon to our inventory is not necessarily synonymous with adding to our national security" and so the process of approving a new system "... must begin with solid indications that a proposed system would really add something to our national security. The United States cannot even seriously consider going ahead with a full-scale weapons-system development until that basic requirement has been met. . . . We need to keep the number of new systems as low as possible consistent with security"⁷⁷ The Air Force suffered particularly hard in this evaluating process, losing not only its sole human spaceflight project, Dynasoar, in De-

⁷⁶ Robert S. McNamara, *The Essence of Security: Reflections in Office* (New York: Harper & Row, 1968), x, 87-88.

⁷⁷ *Ibid.*, 90-91, 93.

cember 1963 but also the nuclear-powered airplane, the B-70 bomber, Saint (an unmanned satellite interceptor) and the Skybolt missile to McNamara's drive for efficiency and centralization between 1961 and 1963. The Air Force said the minimum acceptable number of Minuteman missiles would be 3,000 but only 1,000 were eventually approved.⁷⁸ Said one analyst, "During the first couple of years of the Kennedy Administration, the Air Force could not win a single battle with McNamara."⁷⁹

The specific mechanism whereby McNamara evaluated one system in the context of other systems designed to provide similar capabilities was called Programming and Planning Budgeting System (PPBS), often referred to simply as systems analysis. This dissertation cannot hope to provide complete details of the labyrinthine details of this process.⁸⁰ Fortunately, McNamara did summarize: "Major program priorities can be meaningfully determined only in terms of the total program, and a proper balancing of all the elements of the defense effort can only be achieved at the Department of Defense level."⁸¹ McNamara added, "It provides the mechanism through which financial budgets, weapons programs, force requirements, military strategy and foreign policy objectives are all brought into balance with one another." The result was an annual Five-Year Defense Program which was backed by the "full range of analytic support with operations research and other modern management techniques" which in turn "... allowed us to achieve a true unification of effort within the Department without having to undergo a dras-

⁷⁸ Deborah Shapley, *Promise and Power: The Life and Times of Robert McNamara* (Boston: Little, Brown and Company, 1993), 107.

⁷⁹ Fred Kaplan, *Wizards of Armageddon* (New York: Simon and Schuster, 1983), 255.

⁸⁰ The implementers of systems analysis in the Pentagon under McNamara have written entire books explaining the extraordinary intricacies of PPBS. See Alain Enthoven and K. Wayne Smith, *How Much is Enough: Shaping the Defense Program* (New York, 1971); and Samuel Tucker, editor, *A Modern Design for Defense Decision: A McNamara-Hitch-Enthoven Anthology* (Washington, DC, 1966). Charles Hitch was intimately involved in the systems analysis process as McNamara's Assistant Secretary of Defense, Comptroller. He provides a full-length treatment of PPBS in *Decision Making for Defense* (Berkeley, CA: University of CA Press, 1965) and a concise treatment in "Plans, Programs, and Budgets in the DoD," *Operations Research* 11 (January-February 1963): 1-17.

⁸¹ Cited in William W. Kaufmann, *The McNamara Strategy* (New York: Harper & Row, 1964), 172-73. Kaufmann was a RAND employee where PPBS was largely developed and then one of the "Whiz Kids" McNamara brought into the Pentagon to implement it.

tic upheaval of the entire organizational structure.”⁸² Systems analysis “. . . offered McNamara the natural quantifier with which he could gain control of this sprawling empire.”⁸³

Quantitative analysis was the key. A proposed new project had to include detailed mathematical justification on: a) exactly how it would add to America’s national security; and b) why it was more cost effective to provide that particular capability with this new system than with older existing systems or with other competing proposals for new systems to provide the same particular capability. Alain Enthoven as the Deputy Assistant Secretary of Defense for Systems Analysis explained that PPBS compared programs to determine “. . . the degree of military effectiveness that can be achieved with a particular capability for a given expenditure.” Pentagon Comptroller Charles Hitch continued, “In each case we are interested not only in the military worth of the proposed requirement but also in its cost. In our view, military effectiveness and cost are simply two sides of the same coin. . . . properly applied analytical techniques help to minimize the areas in which unsupported judgment must govern in the decision-making process.”⁸⁴ The new budgeting techniques resulted in a DoD budget with 620 subcategories; when the military services appealed his decisions in every single subcategory in the fall of 1961, McNamara made a point of confirming all 621 of his decisions in a single day.⁸⁵ For the Air Force and its space proposals, NASA’s R&D was part of the PPBS equation in the sense that if the OSD concluded an Air Force space proposal duplicated, or had the potential to duplicate, a NASA project, it was highly unlikely the USAF system would win OSD approval.

The Air Force’s conundrum, of course, was that since so little was known about the space environment in the early 1960s, it had very few hard facts and almost no concrete numbers to incorporate into the systems analysis computers. The Air Force was asked to prove its requirements in a realm, space, for which little information existed, but was not permitted to build the systems required to operate in that

⁸² McNamara, *Essence of Security*, 95.

⁸³ Shapley, *Promise and Power*, 101.

⁸⁴ Both Enthoven and Hitch cited in Kaufmann, *McNamara Strategy*, 179-80.

⁸⁵ Shapley, *Promise and Power*, 103.

realm and thereby gather the requisite information.⁸⁶ This dilemma has been termed the "requirements merry-go-round."⁸⁷ One government report said the USAF's dilemma under McNamara was that "... space experimentation was restricted unless it could prove beforehand that hard requirements existed," which of course could not be done without the information the experiments were designed to gather.⁸⁸

One of the young "Whiz Kids" McNamara brought into the Pentagon to implement PPBS (McNamara increased OSD employment by 1/3 and the number of deputy assistant secretaries of defense from 11 to 26⁸⁹) explained his experiences with McNamara: "He likes to see objectives concretely defined. He abhors the thought that there is only one way of doing something: he is intensely interested in alternatives. And he is a restless seeker of ways to measure the effectiveness of the alternatives. . . . He is an economizer of resources, always on the alert for ways of determining how much is enough to perform a given mission."⁹⁰ McNamara's biographer amplified that at the core of PPBS was McNamara's "... unshakable faith in the importance of financial controls, in the 'truth' as discoverable through statistics, and in the importance of using this kind of information as the basis for organizational planning and control."⁹¹ Of special concern for McNamara was the rapidly growing R&D field, which included most Air Force space expenditures. He told Congress in 1963, "Research and development expenditures, whether measured in budget terms or in program terms, have been mounting steadily over the years, but too much of this effort is not producing useful results. What we want are weapons and equipment that the fighting man can use. We are not interested in supporting the intellectually challenging but militarily useless.

⁸⁶ See Claude Witze, "How Our Space Policy Evolved," *Air Force Space Digest* (April 1962): 83-92.

⁸⁷ For instance, Arnold S. Levine, *Managing NASA in the Apollo Era*, NASA SP-4102 (Washington, DC: USGPO, 1982), 219.

⁸⁸ *Government Operations in Space*, *supra*, 84.

⁸⁹ Shapley, *Promise and Power*, 232.

⁹⁰ Kaufmann, *McNamara Strategy*, 49.

⁹¹ Deborah Shapley, "Robert McNamara: Success and Failure," in Jameson W. Doig and Erwin C. Hargrove, editors, *Leadership and Innovation: A Biographical Perspective on Entrepreneurs in Government* (Baltimore: The Johns Hopkins University Press, 1987), 418.

engineering 'tour de force.'"⁹² This was not a hopeful sign for a robust military human spaceflight program in general or Dynasoar in particular. One observer said that during the Kennedy years, "The Air Force was caught in a bind which threatened to grow tighter than anything it had known and mastered during the Eisenhower period."⁹³

McNamara's drive for efficiency, to eliminate duplication, and to enforce commonality in systems as much as possible certainly had the laudable goal of providing America with the most capable defense at the lowest possible level of expenditure.⁹⁴ However, even scholars sympathetic to McNamara and his Whiz Kids agree that, "A principal result of McNamara's administrative reform was to install a decision-making system that had the effect of increasing the centralization of authority in and around the Secretary of Defense. . . . McNamara's administrative innovations substantially increased the influence of civilian advisers on questions relating to matters of military strategy."⁹⁵ McDougall stated less delicately, "In every functional pyramid, new layers of centralized, civilian bureaucracy splayed out from the organizational box of OSD in 1961." McDougall also discussed ". . . the managerial shift from the uniformed services to the civilian bureaucracy fanning out from the Office of the Secretary of Defense" which "pulled all strings into OSD." He concluded, "McNamara's whiz kids were everywhere, removing every vestige of independent authority and, with it, much of the pride of career officers."⁹⁶

⁹² In the *Military Posture* hearings, *supra*, 462.

⁹³ H.L. Nieburg, *In the Name of Science* (Chicago: Quadrangle Books, 1966), 49.

⁹⁴ This dissertation is not the format in which to evaluate whether or not this actually took place. Again, entire monographs have been written not only to evaluate the success of McNamara's overall PPBS approach, but also its application to specific weapons systems. The most famous example of enforced commonality was the Tactical Fighter Experiment, or TFX, which became the Air Force's FB-111 fighter-bomber. For TFX case studies, as well as overall systems analysis evaluations, see Robert J. Art, *The TFX Decision: McNamara and the Military* (Boston: Little, Brown and Company, 1968) and Robert F. Coulman, *Illusions of Choice: The F-111 and the Problem of Weapons Acquisition* (Princeton, NJ: Princeton University Press, 1977).

⁹⁵ John C. Donovan, *The Cold Warriors: A Policy-Making Elite* (Lexington, MA: D.C. Heath and Company, 1974), 155.

⁹⁶ Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age*, (New York: Basic Books, Inc., Publishers, 1985), 325, 332.

In addition to the obvious loss of institutional power the military services suffered as a result of McNamara's managerial reforms, the way these reforms were implemented also contributed to a sense of dismay among many in the Air Force. McNamara's biographer Deborah Shapley explains that McNamara's "reign was colored by moral righteousness and arrogance" because he and the PPBS cadre he emplaced within the OSD "... were young, fresh, and convinced that history was on their side. Their mistake was to appear contemptuous of the military institutions whose follies they sought to reform." Shapley concluded that McNamara's treatment of the military services "... reveals a basic flaw in his revolution - his disdain for the military institutions and culture he was presuming to change."⁹⁷ She added, "McNamara's analytic strengths were coupled with a limited personal capacity to understand and empathize with the culture and traditions of the organizations he commanded."⁹⁸

The Air Force Reacted

The tension between elements of the Air Force and McNamara's OSD grew quickly and reached a high level. After Thomas White retired as the USAF's top-ranked officer in June 1961 he could honestly express himself, "I am profoundly apprehensive of the pipe-smoking, tree-full-of-owls type of so-called professional 'defense intellectuals' who have been brought into this nation's capital. I don't believe a lot of these overconfident, sometimes arrogant professors, mathematicians, and other theorists have sufficient worldliness or motivation to stand up to the kind of enemy we face." Curtis LeMay succeeded White and commented concerning the 34-year old DDR&E Harold Brown exercising control over Air Force R&D efforts, "Why, that son of a bitch was in junior high school while I was out bombing Japan!" LeMay reportedly asked, "Would things be much worse if Khrushchev were Secretary of Defense?"⁹⁹ LeMay likened McNamara to a hospital administrator who dabbled in brain surgery.¹⁰⁰

⁹⁷ Shapley, *Promise and Power*, 240, 246.

⁹⁸ Shapley, "Robert McNamara: Success and Failure," 420.

⁹⁹ White from the *Saturday Evening Post* and LeMay quotations both cited by Kaplan, *Wizards*, 255-56.

¹⁰⁰ George M. Watson, Jr., *The Office of the Secretary of the Air Force, 1947-1965* (Washington, DC: Center for Air Force History, 1993), 215.

Schriever's Systems Command was probably most affected by the OSD's new procedures and philosophy because it was responsible for the R&D leading up to the USAF's new weapons. He commented, "I never once had a session with McNamara relating to a single major program decision, not one time in all the five-and-a-half or six years that we overlapped." Yet Schriever reported McNamara's "completely undisciplined staff . . . would go charging around all over the country. . . . Most of the time we didn't even know that they were wandering about. In no circumstances were we ever provided with copies of their reports when they came in, so we didn't even know what the hell was going on." Schriever reported that essentially OSD "usurped all this authority, but they had no responsibility" so that Air Force officers were being "whipsawed" by the ever-changing requirements for thousands and thousands of pages of documentation the OSD demanded. Schriever concluded, "Mr. McNamara had no concept of management. . . . He demanded all kinds of loyalty, but he dispensed no loyalty down. . . . So if I seem to have little respect for Mr. McNamara, that's precisely correct. I didn't have while I was on active duty, and I don't have today. I think that he did many things that we're still suffering from and will suffer from for many, many years to come."¹⁰¹ Schriever described his long term efforts to convince McNamara that sometimes the Air Force had to undertake cutting-edge R&D to generate the technology necessary to maintain American military superiority: "I have tried and tried but he won't listen to me."¹⁰²

One should not view such thoughts as simply the bile resulting from military officers having lost autonomy and influence. The USAF's top civilian, Secretary of the Air Force Eugene Zuckert, stated, "I would have to say that my batting average for getting my views adopted by McNamara was very low. . . . I think McNamara saw the Air Force as a very powerful force with the Congress and with the people, by reason of its size and its missions. I think he felt that one way he could control the Air Force was to keep it off balance. He wanted the Air Force to know at all time who was the boss. . . . Even on little things he would get involved" such as when McNamara ordered that no more Naval Academy graduates could

¹⁰¹ Oral history interview of General Bernard A. Schriever, June 20, 1973, K239.0512-676, AFHRA, 35-37.

¹⁰² "A Quiet Retirement," [referring to Schriever's retirement from the USAF] *Time* (September 9, 1966): 25.

transfer to the Air Force. Zuckert concluded, "When McNamara dealt with me, nearly ninety percent of the time he was completely arbitrary. 'The Air Force does not know what they are doing.' 'No, that is not the way it is going to be.' He was very rough."¹⁰³

The official Air Force history of this era confirms. "The Secretary of Defense continued to rigidly control funding and insisted on absolute program definition. . . . Frequently, USAF projects were submerged in cooperative ventures with other national agencies. This situation resulted in part from the efforts of the Secretary of Defense to assure that the most efficient and economical use was made of the nation's space resources" and from the national space for peace policy which ". . . placed the greater emphasis on devoting space to peaceful and scientific purposes, with responsibility vested in a civilian space agency." In fact, recounted the Air Force history, "It was becoming clear by 1963 that there really was no such thing as an 'Air Force Space Program' - that Air Force space activities would be conducted within the context of an overall 'DOD Space Program.'"¹⁰⁴ An article in a professional USAF magazine presented the 1961 situation from the Air Force perspective:

Air Force Spacemen

Enthusiastic, zealous

Long experience in military space work

Eager to sponsor multiple solutions to a single space problem

Advocates of a total space systems concept

OSD Spacemen

Sober, cautious, conservative

New to military space

Determined to select the single best solution in advance

Believers in an R&D demonstration concept

This meant that during the Kennedy administration there was a "fundamental schism" between the USAF and the OSD on how to get a space project started or how to continue to manage one already underway. Said the colonel who created the above table, "Communication between the two agencies was frequently strained, and relations were complex. Following its own convictions rigorously, the OSD began to cancel

¹⁰³ Series of oral history interviews of Zuckert, December 1986, K239.0512-1763, AFHRA, 3. One should remember that Zuckert was relatively close to McNamara, having been on the faculty with him at the Harvard Business School shortly before WWII and that McNamara personally asked Zuckert to serve as Secretary of the Air Force.

¹⁰⁴ Cantwell, *Air Force in Space, FY63*, supra, 1, 8.

or slow down a number of Air Force 'pre-Kennedy' programs. The cases took on a dreary similarity, with a regular pattern of review, revision, de-emphasis, or elimination."¹⁰⁵

The OSD Held Firm

OSD skepticism toward increased military space spending in general and toward the requirement for military officers in space continued, however. DDR&E Brown told Congress in June, 1962, concerning manned military space systems, "I cannot define a military requirement for them. I think there may, in the end, turn out not to be any."¹⁰⁶ Brown added the DoD was relying heavily on NASA to develop the technology of human spaceflight: "We have no intention to preempt those areas which are the proper pursuit of NASA, and, as a sign of this, their planned effort for next year in space is very much larger than those within the Department of Defense. . . . We are not attempting nor do we have any intention or any reason to compete or duplicate the large variety of orbital missions which are planned as part of the national space program by NASA."¹⁰⁷ That same month Brown told a trade magazine, "We cannot visualize or define now a military mission for man-in-space."¹⁰⁸ June 1962 was the same month Kennedy declared, "The military have an important and significant role, though the primary responsibility is held by NASA and is primarily peace, and I think that the proportion of that mix should continue." (see above) Given presidential satisfaction with the civil-military mixture in the United States space program, there was little reason for the OSD to augment the USAF's space budget or approve proposals for new space projects.

Perhaps the clearest expression of DoD's orientation by late 1962 was Deputy DDR&E John Rubel's speech on October 9, 1962 (partially cited above) on military space, which the DoD disseminated as

¹⁰⁵ Paul E. Worthman, Colonel, USAF, "The Promise of Space," *Air University Review* XX (January-February 1969): 124.

¹⁰⁶ Congress, Senate, Committee on Aeronautical and Space Sciences, *NASA Authorization for Fiscal Year 1963*, Hearings, 87th Congress, 2nd Session, June 1962, p. 343.

¹⁰⁷ *Ibid.*, 342-43.

¹⁰⁸ William J. Coughlin, "Speak Up, Mr. Secretary," editorial, *Missiles and Rockets* (June 18, 1962): 46.

an official press release and emphasized its nature as an official DoD policy. The highlights of Rubel's address were:

The program is as close to the optimum size as we can make it in light of all the uncertainties that must accompany such a program, and, in fact, that we probably err on the side of allowing too generous a margin of safety. . . . Extensive programs and projects under NASA supervision will prove equally applicable to systems and devices in space whether these are used for military or non-military purposes. . . . Despite extraordinary efforts we have not evolved any very new ideas for military applications in space during the past several years. This is especially true of manned military applications.

Most manned military missions in space still, after years of study, seem little or no more viable than they ever did. . . . Nevertheless, we are anxious to build a base on which future systems could, if needed, be constructed. We are not yet ready to design the building, but we want the building blocks at hand. . . . Doctrinal abstractions such as 'sea power' or 'air power' or 'aerospace power' are often useful for analysis. . . . But these doctrinal abstractions do not translate well into new programs and projects. Here technology takes over. . . . If you are going around with your head in the clouds, you'd better keep your feet on the ground.¹⁰⁹

The *New York Times* commented, "Pentagon authorities made clear that Mr. Rubel's speech was intended as a rebuttal to members of Congress and some Air Force leaders who have been campaigning for increased military space expenditures."¹¹⁰ McNamara emphasized less than two weeks later, "The requirements for specific military operations in space are not completely clear. Our research and development program is exploring the techniques and the technology, and when and if specific requirements for military operations in space are determined, we will be prepared to apply these developments." Concerning military men in space, McNamara explained, "I am not prepared to say that we will or will not need to have manned spacecraft. I cannot read the future. . . . At this time I see no clear requirement for manned satellites for military purposes. Trying to put a man into the space vehicle leads to complications and delay. . . . At present, we can do almost everything we need to do without a man in the satellite. Much of what we need to do now we can do better without a man - and sooner. But we must be prepared to put man in space in the future should new requirements develop."¹¹¹

¹⁰⁹ Rubel speech, October 9, 1962, DOD News Release No. 1642-62, *supra*, 1, 4-7.

¹¹⁰ "Pentagon Shows Caution on Space," *New York Times*, October 10, 1962, p. 25.

¹¹¹ McNamara, interview in *Missiles and Rockets*, October 22, 1962, reprinted in USAF booklet, *The Military Mission in Space: A Selection of Published Views, August 1962 - June 1963*, June 7, 1963, folder: Military Mission in Space, DoD subseries, Federal Agencies series, NHDRC, no page numbers.

The OSD fully supported Kennedy's emphasis on continuing Eisenhower's space for peace policy, albeit with a new emphasis of human spaceflight via Apollo. OSD officials regularly quashed any speculation about offensive uses of space such as orbital bombardment. Deputy Secretary of Defense Gilpatric on September 5, 1962 emphasized in a speech. "We have no program to place any weapons of mass destruction into orbit. An arms race in space will not contribute to our security. I can think of no greater stimulus for a Soviet thermonuclear arms effort in space than a U.S. commitment to such a program. This we will not do. We will of course take such steps as are necessary to defend ourselves and our allies, if the Soviet Union forces us to do so."¹¹² The report resulting from the JFK-mandated major review of the space program conducted in the fall of 1962 (described last chapter) stated, "The Secretary of Defense and his assistants have taken a restrictive approach in their reviews, based on the conclusion that there are no valid new military requirements which justify at this time a major expansion in the military space programs."¹¹³

Accordingly, in January 1963 the OSD disapproved Air Force space budget requests to start a space station program called the Military Orbital Development System (MODS) and to purchase NASA Gemini capsules and use them for military experiments (Blue Gemini). Those two systems were among the 13 new programs in space the Air Force requested permission from the OSD to start, of which the OSD allowed none. The memo summarizing the military space situation to the USAF Chief of Staff after OSD disallowed almost all of the Air Force's proposed 1962 Five-Year Space Plan said, "In terms of the *Five-Year Military Space Program*, DOD action is short Air Force proposals by 1.3 billion dollars. For FY 64, DOD is providing 55 percent of the level recommended by the Air Force." The memo explained that for spacecraft projects the numbers for Air Force proposals and OSD approval were, in millions of dollars: FY63 - 587 vs. 537; FY64 - 1032 vs. 367; Total - 1619 vs. 804.¹¹⁴ McNamara's rejoinder was

¹¹² Reprinted in "In Gilpatric Speech . . . Military Space Move Left to Russians," *Missiles and Rockets* (September 10, 1962), 16.

¹¹³ Director, BoB, Memorandum for the President, November 13, 1962, Space Activities of the U.S. Government, reprinted in John M. Logsdon, with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 456.

that the FY64 military space budget overall was \$1.65 billion, which was \$50 million greater than FY63 and almost \$400 million greater than FY62. McNamara added that military space represented 20 percent of the entire DoD R&D budget, and amount greater than that devoted to developing strategic weapons.¹¹⁵

Congress and the President on the OSD-USAF in Space

One reporter summarized the OSD-USAF situation: "While the issue is occasionally constructed as competition between NASA and the Air Force for authority and funds, the argument is basically between the Air Force and the upper echelons in the Department of Defense."¹¹⁶ Congressman George Miller, who became the Chairman of the House space committee after Overton Brooks died in September 1961, agreed, "The problem is that the military space enthusiasts have not been able to obtain all the green lights they want from their bosses."¹¹⁷ Miller's speech also indicates one of several reasons why the OSD's space policy was likely to prevail over any attempts to increase military space spending or programs: by the time of the Kennedy administration, NASA had developed powerful congressional patrons. Miller supported McNamara's idea that new military space projects must be justified before they were approved: "But the space critics are vague about what they want. Something really good, they say, is bound to turn up. That's fine. I agree. And as it does, I say, 'let's go.' I cannot understand, however, initiating a program when the requirement it must meet is unknown or can be better met by another system. The balanced program we are following is the one devised by the President after meticulous study of the Nation's needs, resources, and aspirations. . . . Our defense officials are not dolts." Miller pointed out that of all the money America had so far spent in space, 43 percent was for military space: "I find it difficult to view this record as flagrant disregard for the military's interests."¹¹⁸

¹¹⁴ Major General James Whisenand, Assistant Deputy CSAF for Research and Technology, Memorandum to CSAF LeMay, January 30, 1963, folder: 208, box B208, Curtis LeMay papers, LoC, 1. Declassified at author's request.

¹¹⁵ "DOD Space Position Defended," *Missiles and Rockets* (February 4, 1963): 12.

¹¹⁶ Philip Sickman, "The Fantastic Weaponry," *Fortune* (June 1962): 224.

¹¹⁷ Representative George Miller, *Congressional Record*, September 6, 1962, p. 18674.

¹¹⁸ *Ibid.*, 18671-72.

Beyond the OSD and certain important NASA patrons in Congress, the most important determinant of whether or not the OSD's decisions concerning military space and military officers in space would prevail was of course Kennedy. As alluded to previously, he had no great inclination to disturb McNamara's policies nor the general division of responsibilities in the NASA-DoD equation. Numerous sources have observed that "McNamara's actions had the full support of the president."¹¹⁹ that Kennedy "was enamored of McNamara's brilliance, almost always backed him up,"¹²⁰ and that "Because of his standing with Presidents Kennedy and Johnson, McNamara had more influence than any of his predecessors"¹²¹ as Secretary of Defense. Clearly, the Air Force had no choice but to accept McNamara's formulation of the proper scope, scale, content, and pace of the military space program, including his reluctance to authorize officers in space.

There are indications that Kennedy could become extremely agitated at high-ranking military officers, in particular those from the Air Force, again making it unlikely he would be amenable to a larger military space budget that could in any way endanger the space for peace policy, NASA, or Project Apollo. He told his confidant Benjamin Bradlee of the *Washington Post*, "The first advice I'm going to give my successor is to watch the generals and avoid feeling that just because they are military men their opinion on military matters is worth a damn."¹²² Kennedy's recent biographer posits that Kennedy "despised" Air Force Chief of Staff LeMay: "In the White House, Kennedy had walked out on LeMay, more than once. Walking out on generals was a Kennedy specialty. . . . 'I don't want that man near me again,' Kennedy said after one of his walk-outs on LeMay. McNamara and his men learned not to bring the general's name up. 'He had a kind of fit if you mention LeMay,' Roswell Gilpatric warned one of his assistants."¹²³ During the Cuban missile crisis, LeMay reportedly pounded a table and exclaimed, "It's

¹¹⁹ Kenneth J. Meier, *Politics and the Bureaucracy: Policymaking in the Fourth Branch of Government* (North Scituate, MA: Duxbury Press, 1979), 147.

¹²⁰ Kaplan, *Wizards*, 256.

¹²¹ Watson, *Office of the Secretary of the Air Force*, 242.

¹²² Benjamin Bradlee, *Conversations with Kennedy* (New York: Norton, 1975), 112.

the greatest defeat in our history, Mr. President. . . . We should invade today!" JFK later mused. "It's lucky for us that we have McNamara over there."¹²⁴

Herbert York was DDR&E during the Eisenhower administration and for the first few months of the Kennedy administration. His impression was, "I believe that he [Kennedy] was already of the view that the Air Force was much too 'gung ho.' I think or I have the impression that he already felt that the Air Force was what some people might call a little bloodthirsty."¹²⁵ And yet Kennedy did reappoint LeMay as Air Force Chief of Staff. Kennedy commented, "LeMay's like Babe Ruth. Personally he's a bum, but he's got talent and the people love him."¹²⁶ Kennedy stated, "It's good to have men like Curt LeMay . . . commanding troops once you decide to go in. . . . I like having LeMay head the Air Force. Everyone knows how he feels. That's a good thing."¹²⁷ Therefore, one should not overdo Kennedy's animus toward the military or the Air Force. The fundamental point is simply that he was unlikely to embrace any proposals for altering the military space program that McNamara concluded was appropriate nor was he likely to endorse any significant shifts in the NASA-DoD relationship in favor of the Air Force.

One Space Program, Not Two

The final outcome of the entire complicated issue of NASA-OSD-USAF interaction was a reversal of the Eisenhower proposition that a single, unified space program was an impossible goal and should not be pursued. Kennedy's administration in fact concluded a single national program did exist and that what NASA and the DoD did in space must be carefully coordinated so as to avoid waste, duplication, and fruitless effort. This reinforces the conclusion that the Air Force was unlikely to receive approval for any

¹²³ Richard Reeves, *President Kennedy: Profile of Power* (New York: Simon and Schuster, 1993), 182.

¹²⁴ Michael Beschloss, *The Crisis Years: Kennedy and Khrushchev, 1960-1963* (New York: Harper Collins, 1991), 544.

¹²⁵ Oral history interview of Herbert York, June 16, 1964, folder: Kennedy Library, box: White House, Presidents, Kennedy, Photographs - Presidential Library, NHDRC, 9.

¹²⁶ Reeves, 183.

¹²⁷ Arthur M. Schlesinger, Jr., *A Thousand Days: John F. Kennedy in the White House* (Boston: Houghton Mifflin Company, 1965), 912.

program that, when evaluated in light of any NASA project, could be accused of overlap or redundancy. Any number of senior administration officials made the same point Deputy Secretary of Defense Gilpatric did in June 1962: "Some people have the erroneous impression that there are two space programs - a NASA program and a DOD program. What this nation has in fact is a National Space Program, part of which is funded and directed by NASA and part of which is funded and directed by DOD."¹²⁸ In another forum Gilpatric added, "It is a primary policy objective of both of us that our efforts in the Defense Department and those of the NASA shall be conceived, planned, and executed to insure that the totality of our space efforts adds up to a single program in the national interest."¹²⁹ Kennedy's 1962 report to Congress stated, "It is national policy to maintain a viable national space program, not a separate program for NASA and another for Defense. . . ."¹³⁰

An ancillary point that complemented the idea that America had a single, coordinated space program was the idea that American military activities in space were peaceful activities, just like NASA's. Therefore, one should not speak of the 'military' use of space and the 'peaceful' use of space but rather of the aggressive and nonaggressive use of space. Behind this conclusion was of course the commitment to ensuring that reconnaissance satellites would enjoy unmolested transit through space. A State Department official explained, "The test of the legitimacy of a particular use of outer space is not whether it is military or non-military, but whether it is peaceful or aggressive. . . . The United States has military space programs, but all of our space activities will continue to be for peaceful, i.e., defensive and beneficial purposes."¹³¹ One of the strongest administration exponents of the "military space is space for peace" proposition was NASC Executive Secretary Edward Welsh. He delivered many speeches in which he ex-

¹²⁸ Gilpatric, Statement Before the Senate Committee on Aeronautical and Space Sciences, June 13, 1962, Congressional Appearances, Roswell Gilpatric papers, Kennedy Library, as cited by Derek W. Elliott, *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963* (Ph.D. dissertation, George Washington University, 1992), 191.

¹²⁹ Roswell Gilpatric to the Senate space committee, November 1963, testimony inserted into the *Congressional Record*, November 20, 1963, p. 21350.

¹³⁰ Cited in *Government Operations in Space*, *supra*, 63.

¹³¹ Richard N. Gardner, Deputy Assistant Secretary of State for International Organization Affairs, "Cooperation in Outer Space," *Foreign Affairs* 41 (January 1963): 359.

plained. "We do not have a division between peaceful and non-peaceful objectives in our space program. All the objectives are peaceful. It should be clear, however, that projects to help keep the peace are just as peaceful as any other space projects."¹³²

Vice President Johnson declared, "... the United States does not have a division between peaceful and non-peaceful objectives for space, but rather has space missions to help keep the peace and space missions to improve our ability to live well in space."¹³³ Johnson emphasized later in 1962 that "... all of the U.S. space projects are peaceful, including those which help us maintain the peace. ... So far as the U.S. is concerned, there is not a distinction between peaceful and nonpeaceful purposes. They are all purposes. I wish I could say the same with confidence about the plans and objectives of the USSR."¹³⁴ One of the instructions Kennedy issued to Americans representatives to the UN Outer Space Committee and General Assembly in August 1962 was to forcefully explain and defend the notion "... that the distinction between peaceful and aggressive uses of outer space is not the same as the distinction between military and civilian uses, and that U.S. aims to keep space free from aggressive use and offers cooperation in its peaceful exploitation for scientific and technological purposes."¹³⁵ Again, the point to carry forward into the discussion of the intricacies of the NASA-DoD relationship and then into the next chapter's discussion of Dynasoar-Gemini-MOL is that at the highest administration levels, up to and including the President, there was a strong desire to avoid any suggestion whatsoever that the United States had any aggressive intent in space. While it actively encouraged the notion that the defensive military uses of space were in fact peaceful uses, the administration simultaneously insisted that the OSD ensure no offensive uses of space taint the American space program.

¹³² Edward Welsh, Message to the American Legion, October 6, 1962, folder: McNamara-Webb Report/Logsdon Interviews, box: White House, Presidents, Kennedy, Correspondence, Apollo Decision Documentation, NHDRC, 1.

¹³³ Introduction, *U.S. Aeronautics and Space Activities, 1961*, supra, 6.

¹³⁴ Johnson, "The Vision of a Greater America." *The General Electric Forum for National Security and Free World Progress V* (July-September, 1962), 8.

¹³⁵ NSC, NSAM 183, Explanation and Defense of US Space Program, August 27, 1962, NSA PD document 915, p. 1.

The NASA-DoD Relationship: An Overview of Support, Coordination, and Rivalry

Generally, No Major Problems

Shortly after he was sworn in as NASA Administrator, Webb and his Deputy Hugh Dryden met with senior DoD officials (McNamara, Gilpatric, outgoing DDR&E York) to discuss how the two organizations would keep in touch. Webb reported, "It was agreed that Mr. Gilpatric and I would meet from time to time for lunch and would bring others as needed."¹³⁶ With that there began the extensive interaction between Webb and assorted senior DoD officials that continued throughout the Kennedy administration. Important points relating to the lunar landing decision's NASA-DoD component were surveyed in the previous chapter. Other important groundwork can be found in this chapter's discussion of the supposed Air Force campaign to gain a larger role in the space arena. The remainder of this chapter will attempt to examine the specifics of the support, coordination, and rivalry that comprised the NASA-DoD institutional relationship from 1961 to 1963.

By the summer of 1961, shortly after Kennedy's lunar landing decision, the NASA-DoD situation seemed to be well under control. The minutes from a July AACB meeting note "... that the Vice President was astonished and delighted at the unanimity of the NASA-DOD recommended program objectives and approach."¹³⁷ Schriever emphasized to his boss that he desired to assist NASA in the lunar landing program in every way possible, regardless of what his personal opinion might be on the underlying space for peace policy: "Our relationship has been very good. We have worked out at the working level a very good relationship. I think that . . . there are many things in the Lunar Program that will have military applications."¹³⁸ An NASC meeting including Johnson, Secretary of State Dean Rusk,

¹³⁶ James Webb, Memorandum for Record, February 24, 1961, SPI document 984, p. 1.

¹³⁷ Minutes of the 9th Meeting of the Aeronautics and Astronautics Coordinating Board, July 19, 1961, box: AACB DOD/NASA, Box: Aeronautics and Astronautics Coordinating Board # 4, NHDRC, 2.

¹³⁸ Schriever, Letter to CSAF LeMay, undated but sometime shortly after Schriever's testimony to the Senate Armed Services Committee on July 20, 1961, folder: USAF Documents/Correspondence, DoD subseries, Federal Agencies, NHDRC, 1.

McNamara, and Webb recorded in August. "Coordination between NASA and DOD is excellent, with every intention to keep it that way."¹³⁹

As NASA's lunar landing program gained momentum, the Air Force began to realize that while its lunar landing role was primarily supportive in nature, it was nonetheless important because Apollo would also create the "building blocks" of spaceflight experience and infrastructure. Zuckert said, "The NASA has a massive program to acquire a capability to operate in space. The Air Force is supporting it to the limit of our abilities. We need what NASA will learn. . . . We have an excellent working relationship with the NASA and feel that we, NASA, and the Nation benefit from this relationship."¹⁴⁰ In March 1962 Zuckert emphasized that the peacetime role of NASA and the defense role of the Air Force in the national space program ". . . must advance in harness, and they do. They are interdependent. One cannot move without the other."¹⁴¹ While the OSD and the USAF had their differences over military space policy, OSD officials such as Rubel agreed that the basic NASA-DoD situation and level of cooperation ". . . has been one of continuing improvement since the creation of NASA, as operating procedures evolved, as policies were established, as relative responsibilities were defined, as personnel became better acquainted and familiar with each other's problems, as internal organizations were improved and as the Aeronautics and Astronautics Coordinating Board mechanism evolved."¹⁴² Seamans recalled that Webb had a self-imposed rule that appointments to sensitive NASA positions like Associate Administrator for Manned Space Flight were to be cleared with the DoD.¹⁴³

¹³⁹ NASC, Summary Minutes, August 18, 1961, folder: NASC Meeting August 18, 1961, box: 1, RG 220, Records of the National Aeronautics and Space Council, NARA, 2.

¹⁴⁰ Zuckert, Statement in the *GE Forum*, January 10, 1962, as reprinted in the collection from the Air Force Office of Information, *Policy Statements on Military Space*, September 19, 1962, 168.7171-65, AFHRA, 2.

¹⁴¹ Zuckert speech, March 6, 1962, extracted in *Air Force Information Policy Letter for Commanders XVI* (March 15, 1962): 1.

¹⁴² John Rubel, letter to Edward Welsh, April 10, 1962, folder: NASC meeting, March 21, 1962, box 1, RG 220, Records of the National Aeronautics and Space Council, NARA, 14.

¹⁴³ Levine, *Managing NASA in the Apollo Era*, supra, 138.

In fact, one of the trade magazines most critical of the perceived slighting of military space commented in April 1962 on a "gleeful conspiracy" between NASA and the Air Force which consisted of ". . . the growing cooperation - both in spirit and deed - between the National Aeronautics and Space Administration and the U.S. Air Force." The magazine said there were ". . . some top NASA officials, possessed of a vision broader than the confines of their own agency, who are acutely aware of the need for major manned and unmanned military space programs. . . . To bring these military capabilities to fruition at the earliest possible moment, they are aiding and abetting the movement to bring the Air Force, to a certain degree, under NASA's strong financial shelter in the Apollo program."¹⁴⁴ Shortly thereafter a NASA official wrote to the magazine to say, "I thoroughly enjoyed reading your perceptive and well-written editorial."¹⁴⁵ Zuckert chimed in, "We [NASA and the Air Force] work together as a team, not as rivals. And together we are doing the spadework for the space technology of tomorrow."¹⁴⁶ McNamara added, "Increasingly, the space efforts of Defense and NASA have become interwoven and more effective. . . . I am determined . . . to ensure the continuation of this excellent relationship."¹⁴⁷ These institutional encomiums could be cited *ad infinitum* but the point remains: at least for public consumption, and often in private meetings, high administration officials displayed no sense of alarm or even concern over potentially serious NASA-DoD conflict.

NASA-DoD Difficulties

This is not to say that tension, rivalry and conflict were absent, however. Most of the clashes are directly associated with the management of the Gemini program, its relationship to Dynasoar, and the repercussions of both the Gemini and Dynasoar problems on the space station/MOL issue. Therefore,

¹⁴⁴ William J. Coughlin, "The Gleeeful Conspiracy," editorial, *Missiles and Rockets* (April 23, 1962): 46.

¹⁴⁵ O.B. Lloyd, Jr., Director, NASA Office of Public Services and Information, Letter to the Editor, *Missiles and Rockets* (May 14, 1962): 7.

¹⁴⁶ Zuckert, Speech released in the form of DOD News Release No. 1017-62, June 19, 1962, file: Eugene Zuckert, Biographical series, NHDRC, 2.

¹⁴⁷ McNamara, Statement Before the Senate Armed Services Committee on the FY 1964-68 Defense Program, January 21, 1963, *supra*, 136.

these will be detailed in the next chapter. However, some hints of a more general, institutional strain are also detectable. NASA's Deputy Associate Administrator for Defense Affairs W. Fred Boone correctly pointed out, "When there are two government agencies that have responsibilities and areas of activity which to some extent overlap, that in a sense compete for budget dollars, and that are headed by two such dynamic, strong-willed, articulate men as Mr. Webb and Mr. McNamara, one should not be surprised to find conflicting policies and opinions between them."¹⁴⁸ For instance, Boone said that in the opinion of NASA leaders, McNamara unreasonably and "... consistently avoided any acknowledgment that the NASA R&D program was making a contribution to national security." This attitude of the Pentagon top management toward NASA "filtered down through all echelons of the Defense establishment" and as a result "... some key officials in OSD and the Services ... appeared to be inhibited from laying before us their needs for new technology and from exploring opportunities for cross-support for fear of bringing down on their heads the ire of the Secretary of Defense."¹⁴⁹

Webb wrote Johnson in May 1963 with three suggestions for improving coordination between NASA and the DoD, which he felt was good but could be better. First he called for, "Earlier coordination in the study phase of advanced projects to eliminate unwarranted duplication. . . ." Webb said that "cross-fertilization" of research and technology should be strengthened so as to "... reveal additional applications of NASA discoveries and advancements to some of the most critical military problems." Finally he desired, "Greater participation by the DOD in NASA projects to enhance the knowledge and capability of the services in space and space-oriented applications."¹⁵⁰

In the summer of 1963 Boone wrote an extensive report surveying the "divergent philosophies, attitudes, and interpretations of the Department of Defense and the National Aeronautics and Space Administration. . ." and concluded that specific problems appeared to be centered in the areas of: national

¹⁴⁸ Boone, *NASA Office of Defense Affairs*, 8.

¹⁴⁹ *Ibid.*

¹⁵⁰ Webb, Memorandum for the Vice President, May 10, 1963, folder: Eisenhower - Defense Policy [memo is probably misfiled], box: White House, Presidents, Eisenhower, Space Documentation, NHDRC, 17.

policy; planning; ground support operations (ranges, tracking stations, data collection centers); and aeronautical research. The first two are immediately relevant to this dissertation. Concerning national policy, Boone stated, "DoD sees the civilian and military space programs as one program which should be jointly conducted to attain both civilian and military objectives." Therefore, the military should have a stronger voice in shaping the direction of the total space program. In turn this had made for DoD attempts to achieve greater roles in some NASA programs such as Gemini. Boone added,

The desire to control is especially strong within the Air Force because many within it consider space operations "simply an extension of flight operations in the atmosphere, and therefore should be under Air Force control. Lacking greater support for this position at the DOD level, the Air Force has made 'end runs' to members of Congress and the White House staff, and has launched an intensive and well organized public relations campaign to convert the public to the Air Force point of view. The Air Force is inclined to look upon NASA as a competitor rather than a partner in the field of space.

Boone recommended that McNamara and Webb conduct a vigorous effort to indoctrinate their subordinate staffs and agencies to the facts: first, it was and is the intent of Congress for the United States to maintain in the eyes of the world a peaceful image for the United States space program and so NASA will remain an independent, civilian agency; second, certain advantages accrue to the DoD from civilian management such as international cooperation and the R&D issuing forth from civilian scientific organizations and universities.¹⁵¹

On the issue of planning there appeared to Boone to be a difference of opinion concerning the desirability of joint programs versus coordinated programs. DoD seemed to desire the former because in joint programs both participating agencies receive equal management and decision-making responsibilities; no major decisions are made without the concurrence of both agencies. NASA preferred the latter because in the coordinating process NASA maintained managerial and decision-making control while fully recognizing the DoD's interests in, and keeping it informed concerning the progress of, major NASA programs such as Gemini. For instance, concerning its long-range studies for space stations, NASA did not want to be limited by having to specifically tie various space station concepts to military operational

¹⁵¹ Boone, Report to Webb, NASA-DoD Relations, July 12, 1963, reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, 348-56.

requirements. At the same time, NASA desired to be “. . . ever alert to discern those areas of research which appear to offer the most promising potential for the solution of military problems.” If NASA had to obtain DoD concurrence to conduct studies of future concepts, this would “seriously obstruct NASA’s ability to discharge its statutorily assigned functions.” Nevertheless, Boone explained DoD strongly believes that all planning related to NASA programs which were of interest to DoD should be jointly conducted from its inception: “This view has led DOD to seek inflexible agreements concerning the manner in which NASA’s advance exploratory studies may be initiated, including sign-off authority for DOD.”¹⁵² The ramifications of these policy and planning differences will become clearly evident in the next chapter’s Gemini-Dynasoar-MOL discussion.¹⁵³

Webb-McNamara Difficulties

Despite Boone’s dispassionate discussion of the general disagreements between NASA and the DoD, most of the non-programmatic, leadership/headquarters-level tension appeared to have resulted from direct clashes, related to personality conflicts and otherwise, between Webb and McNamara. For instance, records from a meeting McNamara attended in March of 1963 to discuss Dynasoar contain the following puzzling observation: “Mr. McNamara raised the question of what would be an optimum test bed [for hypersonic R&D] during the NASA briefing. Someone at the NASA briefing raised the point that the Space Act provided that Space be used for ‘peaceful purposes.’ Mr. McNamara was very scornful, saying that he was prepared to get the law changed.”¹⁵⁴ This supposed McNamara remark must remain a mystery because no further evidence exists of McNamara attempting to have the Space Act amended. At a minimum, however, it does indicate that McNamara had some type of negative feelings (“scornful”) to-

¹⁵² Ibid.

¹⁵³ Boone’s discussion of the two remaining points, ground support operations and aeronautics, while interesting, is not directly relevant to this discussion and in fact any useful treatment of the NASA-DoD relationship in each merits at least a chapter-length treatment, possibly even an entire monograph.

¹⁵⁴ Brockway McMillan, Assistant Secretary of the Air Force for Research and Development, Memorandum to Zuckert, March 15, 1963, documents in the possession of Major Roy Houchin, AFHSO/Pentagon, 2.

wards the general concept of space for peace, and possibly even NASA, although this certainly did not translate into any amenability toward Air Force space proposals (see above).

More concrete evidence does exist documenting the Webb-McNamara personal difficulties. McNamara's Deputy, Gilpatric, recounted that McNamara "... took a dislike to Webb because Webb took so long in getting to the point. And so I think he mishandled Webb. He sort of goaded him into taking extreme positions. The result would be that Webb would go up to the Hill and see his good friends like Bob Kerr [Chairman, Senate space committee] and Clint Anderson [Chairman, House space committee] and didn't do McNamara any good. . . . It was just an unnecessary bit of exacerbation to take him on in such a militant fashion."¹⁵⁵ W. Henry Lambright, Webb's biographer, interviewed McNamara and reported, "Webb talked too much for him and was too 'political.'" Seamans' believed, "McNamara was more powerful than Webb. But Webb had more guile." Lambright's account of the overall situation states

In the early period after the Apollo decision, Webb and McNamara met regularly for lunches, accompanied by aides, to facilitate coordination. At one of these lunches, McNamara lectured Webb, so offending the NASA administrator that he and Seamans walked out, and the regular lunches were discontinued. Although the two senior officials dealt with one another as little as possible thereafter, they had to cooperate to some extent for common interests. Webb used Seamans as a surrogate, and McNamara used similarly appropriate substitutes.¹⁵⁶

This dissertation's author interviewed Seamans who confirmed the above account of what Seamans called "The Black Luncheon." At this particular luncheon, McNamara told Webb there was no point in their having meetings "just for pleasantries." Webb agreed and McNamara stated, "I just happen to have a piece of paper here" and proceeded to read from it. Seamans recalled, "Well, boy, you never heard such a scathing, denunciation of NASA. It was about a page-and-a-half or two pages on how we'd agreed to things and hadn't carried through on them. Jim's face was getting red and he was getting madder and madder and madder. He practically exploded. And that was the last meeting we ever had."

¹⁵⁵ Oral history interview of Gilpatric, June 30, 1970, from *The John F. Kennedy Presidential Oral History Collection, Part I: The White House and Executive Departments*, microfilmed from the holdings of the John F. Kennedy Library (Frederick, MD: University Publications of America, 1988), reel 5.

¹⁵⁶ All references from Lambright, *Powering Apollo*, 120, 240 note 56.

Seamans dated this incident to between the spring and fall of 1962. Seamans said he and Rubel had to handle most direct NASA-DoD communication from that point forward because Webb and McNamara would not speak to each other.¹⁵⁷ Webb testified that he had to remind McNamara, when they were speaking, that McNamara should not and could not treat Webb like McNamara treated his service secretaries and other subordinates: "I did tell him that, on an occasion when I felt that improper pressures were being applied. I said, 'You are not going to get NASA under your thumb, as you have the Air Force. . . . There was always this feeling, if NASA joins with the Air Force, then it makes a lot of problems for the Secretary of Defense. And I always made clear to him, we wouldn't do that. But they still never were quite sure. . . .'"¹⁵⁸

In another interview Webb recalled meeting with Kennedy three weeks before Kennedy's death to relate to him that space might become an issue in the election campaign because, "McNamara will not say that this program has military advantage. I will say that every bit of the things we're doing contributes to the military." Kennedy replied, "Well, you're not going to let this get personal, are you?" Webb said, "No. Just the fact that that's the way it is." Kennedy concluded by telling Webb, "Go ahead and do what you think is right."¹⁵⁹ The point is that in setting the stage for the discussion of the specific support, coordination, and rivalry that is to follow, it is necessary to note that not all was sweetness and light between the two organizations, or at least the organizations' leaders. There was an undercurrent of tension between McNamara and Webb that could erupt, most particularly with Project Gemini (next chapter).

¹⁵⁷ Oral history interview of Seamans, July 5, 1996, by the author. It must be reiterated that the author made repeated attempts to secure an interview with Mr. McNamara but they were all rebuffed. McDougall in *The Heavens and the Earth*, p. 513, note 55, cites an oral history interview with Willis Shapley, who was responsible for both the NASA and DoD budgets within the BoB before he became a NASA Deputy Associate Administrator in September 1965, in which Shapley confirmed that by late 1962 Webb and McNamara were "not speaking to each other."

¹⁵⁸ Oral history interview of Webb, April 11, 1974, file: James Webb, Biographical series, NHDRC, 33-34.

¹⁵⁹ Oral history interview of Webb, October 15, 1985, NASM, 226.

The NASA-DoD Relationship: Tension and Rivalry Specifically

Of Belly Bands and ICBMs

Shortly after being sworn in as Administrator, Webb had to choose between alienating the Air Force and alienating his own NASA staff. The Mercury-Atlas (MA) test flight had failed during the Eisenhower administration due to a catastrophic explosion. Investigations revealed the most likely cause to have been weakness of the metal where the Mercury capsule was mated with the Atlas ICBM. NASA proposed that for the next test launch, scheduled for February 18, 1961, four days after Webb's confirmation, this section of metal be strengthened with the addition of a sort of 8-inch wide steel corset or "belly band," until the thicker-skinned Atlases that NASA had on order could be delivered. Schriever and the Air Force protested vehemently because another Atlas failure would reflect very badly on the United States ICBM deterrent force, then based on the Atlas. Schriever wrote, "It is my recommendation that no more thin-skin Atlas boosters should be flown in the Mercury program because of the high risk of failure. . . . The only sensible approach is to delay the next Mercury/Atlas flight until approximately 1 April 1961 when a thick-skin Atlas will be available." Schriever further explained, "Since failure of the Atlas booster during launch would reflect unfavorably on the prestige of the United States and would be incorrectly interpreted by many agencies as a weakness in the Atlas weapon system, I do not concur with the proposed launch of the field modified (restraining band) booster."¹⁶⁰

Webb supported NASA's decision to launch and refused to budge even when the Air Force took its protest to the White House level by appealing to Kennedy's science adviser Jerome Wiesner. Webb related he felt he had to trust his new organization and staff: "I knew that if I turned their advice down and took advice from outside of NASA, I would have a very hard time building the confidence of the staff."¹⁶¹ The launch went ahead on February 21 and was successful. Webb called his choice to back NASA a "critical decision" because it set the tone of his supporting NASA in the face of Air Force pres-

¹⁶⁰ Schriever, Memorandum to General Curtin, Office of the Secretary of the Air Force, Mercury MA-2 Launch Decision, February 13, 1961, SPI document 32, pp. 5-6.

¹⁶¹ Webb, oral history interview of, March 15, 1985, NASM, 88.

sure, even when applied at the presidential level.¹⁶² As his biographer states, Webb's fortitude "proved an auspicious beginning for the new administrator," won him the gratitude of NASA's professional cadre, and "... won the grudging respect of the air force, which knew Webb could not be intimidated." In addition, since NASA's technical judgment had proven correct, "... the air force would not be so quick next time to challenge Webb and those advising him."¹⁶³ Webb recalled his first weeks at NASA as a time when he and Air Force leaders were "like two strange animals. . . sparring around, smelling each other, seeing what could be done, testing each other out."¹⁶⁴ The director of the Mercury program said Webb's decision saved 4-5 months on Mercury's schedule, compared to waiting for the thicker-skinned missiles before restarting testing.¹⁶⁵

Combine NASA and the Air Force?

From chapter 4 it will be recalled that CSAF Thomas White had written several of his subordinate commanders on April 14, 1960:

I am convinced that one of the major long range elements of the Air Force future lies in space. It is also obvious that NASA will play a large part in the national effort in this direction and, moreover, inevitably will be closely associated, *if not eventually combined with the military*. It is perfectly clear to me that particularly in these formative years the Air Force must, for its own good as well as for the national interest, cooperate to the maximum extent with NASA, to include the furnishing of key personnel even at the expense of some Air Force dilution of technical talent. . . . I want to make it crystal clear that the policy has not changed and that to the very limit of our ability, and even beyond it to the extent of some risk to our own programs, the Air Force will cooperate and will supply all reasonable key personnel requests made on it by NASA.¹⁶⁶

This highlighted passage is almost always cited, out of context, by individuals who want to prove the Air Force was campaigning to take over NASA. This Eisenhower-era letter is relevant to the Kennedy-era

¹⁶² Webb, oral history interview of, April 11, 1974, *supra*, 38.

¹⁶³ Lambright, *Powering Apollo*, 90.

¹⁶⁴ *Ibid.*, 91.

¹⁶⁵ Oral history interview of Robert Gilruth, February 27, 1987, NASM, 247.

¹⁶⁶ CSAF Thomas White, letter to Generals Landon and Wilson, Air Force Deputy Chiefs of Staff for Personnel and Development, with copies to Schriever and LeMay, among others. April 14, 1960, folder: Civilian vs. Military Role in Space, DoD subseries, Federal Agencies series, NHDRC, 1. Emphasis added.

NASA-DoD rivalry/tension discussion because it was not until the Kennedy administration that it was extensively discussed. Congress held hearings to discuss McNamara's DoD Directive 5160.32, and as part of these hearings the general question of the DoD's intentions toward NASA came up, as did White's letter in particular.

When asked if he believed the DoD should take over NASA Gilpatric emphatically replied, "I certainly do not. We have plenty of problems today. We don't need any more." When asked, "And you say now you have no intention of infringing upon any of the rights of NASA?" Gilpatric replied, "That is correct." White explained his sole purpose was to "make it crystal clear that the policy is we will cooperate with NASA," even at some risk to Air Force programs. When asked if there was any planning at any level within the Air Force to take over NASA White replied, "Absolutely not. None then, none now, and I know of no one else who has contrary views in the Air Force. I would like to point out that this is not a statement of advocacy, but a statement of possible fact. . . . No planning whatsoever."¹⁶⁷ White closed by assessing NASA-DoD relations as ". . . optimum, both in the past, present, and I am certain for the future. . . . the job is plenty big for all of us. . . . The idea of a combination is so remote to my own thinking that I haven't seen that particular specter."¹⁶⁸

Next to testify concerning White's letter was Schriever, who allowed that he was probably largely responsible for White feeling compelled to pen it. Schriever explains he had expressed reluctance at giving up some of his officers currently working on Air Force space systems and transferring them to NASA: "I knew it would hurt ARDC considerably to turn these people over to NASA, so I resisted their assignment, not because I didn't want NASA to have them, but because of the effect it would have on ARDC." Therefore, White issued his letter making it clear the Air Force would support NASA personnel requests."¹⁶⁹ Chairman Overton Brooks asked Schriever, "There is no effort on the part of the Air Force to encroach on the normal fields of NASA activity, is there?" Schriever replied, "No sir. . . . I see no reason

¹⁶⁷ *Defense Space Interests*, *supra*, 35-36, 92-93.

¹⁶⁸ *Ibid.*, 97, 101.

¹⁶⁹ *Ibid.*, 101.

why we cannot work shoulder to shoulder in the most cooperative manner and there is plenty to do for both, I can assure you."¹⁷⁰

When the House space committee issued its report it summarized.

Witnesses from the Department of Defense have disavowed any designs on NASA, and have renewed promises to work in full cooperation with NASA. The committee is happy to have these assurances from the proper officials in DOD. However, the committee has a large bulk of printed material which derogates NASA in relation to the Department of Defense. This would seem to throw the responsibility for slurring remarks about the importance or the efficacy of NASA on nongovernmental sources; but whatever the source, the committee regrets such attacks as unwise.¹⁷¹

Apparently the committee was hopeful that the AF-NASA situation was under control but left the impression that Congressional vigilance would continue. Therefore, any Air Force attempts at making in-roads into NASA's responsibilities, however unlikely they might be, would be met with firm congressional resistance at the hands of NASA's congressional patrons should such attempts ever materialize.

A Sample of Working-Level Difficulties

Beyond the headquarters, McNamara-Webb level of tensions in the policy-making realm, it at least bears mentioning that there were problems at the working level where policies were supposed to be executed. Perhaps the most persistent problem area was the question of the national launch ranges and which organization should control what portions and functions of the ranges. A full examination of this question would require a separate chapter at a minimum, but a brief survey provides some working-level detail to the story of high-level policy making.

The main United States launch facility was at Cape Canaveral on Florida's east coast; the many and diverse Air Force facilities, including tracking stations, associated with the Florida range were collectively termed the Atlantic Missile Range (AMR) and later the Eastern Test Range (ETR). The range and its support components had been developed primarily by the Air Force after WWII and was operated by the USAF for all agencies who used it. However, when Kennedy tasked NASA with Project Apollo, NASA

¹⁷⁰ Ibid., 105-06.

¹⁷¹ Congress, House, Committee on Science and Astronautics, *Military Astronautics (Preliminary Report)*, Report No. 360, 87th Congress, 1st Session, May 5, 1961, p. 36.

would assume a much greater role at the Cape because of the huge size of the Saturn family of boosters necessary to take three humans to the moon and back. One historian explained that if all stages of the Saturn V were to explode simultaneously, "the force of the detonation would approach that of a small atomic bomb."¹⁷² This being the case, NASA would require a large amount of undeveloped land near Cape Canaveral to construct its own launch facilities; in the meantime, it would call even more heavily upon the Air Force's range infrastructure for the interim launches. By August 1961, NASA had announced its plans to purchase 324 square kilometers (111,000 acres) north of Cape Canaveral, centered on Merritt Island. From this point forward there was at least two years of constant bickering between the Air Force and NASA over myriad questions associated with the new Merritt Island Launch Area (MILA): Who would buy which portions of land? Where would the Saturn launch sites and their required buffer zones be located on the new land? Could the Air Force place any launch sites for its new, large booster, the Titan III, on NASA's parcel? Could the rockets launched by one agency overfly the other agency's facilities? What role would each agency play in the administration and management of the new MILA and its facilities and how would this impact upon current practices at AMR? Which agency would fund which range activities and based upon what formula?¹⁷³

On the one hand, "The Air Force quite simply viewed the new area as an extension of Cape Canaveral Missile Test Annex."¹⁷⁴ On the other hand, NASA wanted to have a much higher degree of autonomy at the MILA facility than it had at AMR, where NASA was essentially a client of the Air Force, required to formally request the use of launch stands, tracking stations, etc. through the Air Force hierarchy. By mid-1962 "the bureaucratic infighting reached a draw." The Air Force was allowed to construct its Titan III launch sites on the south end of MILA. In return NASA retained jurisdiction over the entire complex and received permission to acquire sixty more square kilometers at the north end because of the

¹⁷² Roger Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990*, NASA SP-4406 (Washington, DC: USGPO, 1989), 69.

¹⁷³ The best treatment of this complex bureaucratic wrangling is Charles D. Benson and William B. Faherty, *Moonport: A History of Apollo Launch Facilities and Operations*, NASA SP-4204 (Washington, DC: USGPO, 1978), 80-105.

¹⁷⁴ *Ibid.*, 95.

Air Force facilities on the south end of MILA. By the time of the first NASA-DoD MILA agreement in January 1963, it was agreed MILA would be considered a NASA installation, separate and distinct from AMR. There would, in essence, be two and not one launch ranges in Florida, over the Atlantic Ocean, Africa, and into the Indian Ocean. In sum, "NASA had established its status as more than a tenant of the Air Force. . . . The decision finally came down - NASA, and not NASA and the Air Force - would put a man on the moon."¹⁷⁵

As one reporter observed, "Crossing from Air Force installations into NASA's . . . is like going from one country into another."¹⁷⁶ The story of AF-NASA tension over MILA specifically and the national range question in general was far from over. Over the course of the Kennedy and Johnson administration, innumerable sub-issues were constantly being discussed at one level or another: Who would reimburse who and at what level for services rendered? Who was responsible for and would pay for the aircraft that helped track spacecraft after launching? The ships that did the same thing? Who would be in charge of which of the many overseas tracking stations? Should these worldwide facilities be combined and operated in a co-located manner for both NASA and DoD? Under whose control? The list goes on and on and on. Boone's memoirs are probably the easiest access to this complex panoply of issues.¹⁷⁷ It is sufficient to note that there was no shortage of working-level tension as these myriad questions were negotiated and settled, sometimes over several years.

When all was said and done, however, Zuckert expressed what was important from the headquarters, policy making perspective: "At the top level, we know it's absolutely necessary for progress in both the military program and in the NASA program that we get along. We can't afford to be played off one against the other. . . . There has been a maturing of the relationship. Sure, there'll be difficulties and the difficulties will generally be exaggerated."¹⁷⁸ Perhaps some of these rumblings of NASA-DoD tension/

¹⁷⁵ Ibid., 104.

¹⁷⁶ Richard Austin Smith, "Canaveral, Industry's Trial by Fire," *Fortune* (June 1962): 204.

¹⁷⁷ *NASA Office of Defense Affairs*, *supra*.

¹⁷⁸ Oral history interview of Zuckert, September 1965, K239.0512-763, AFHRA, 40.

rivalry even reached Kennedy. One of his questions to Lyndon Johnson in April 1963 was, "Are we taking sufficient measure to insure the maximum degree of coordination and cooperation between NASA and the Defense Department in the areas of space vehicles development and facility utilization?"¹⁷⁹ To which Johnson replied that the NASC, AACB, numerous coordinating arrangements within the agencies, and more than fifty joint written agreements were all operating or in effect to insure the maximum degree of coordination in the National Space Program. "However," he added, "it is inevitable that controversies will continue to arise in any field as new, as wide ranging, and as technically complicated as space. . . . It must be kept in mind that no mechanical application of a formula will insure maximum cooperation and coordination and a minimum of duplication and waste. Continuous monitoring at a high level is essential at every stage of the development of the space program."¹⁸⁰ Therefore while Johnson did not ignore the tension and rivalry that existed, he was confident that it was under control and that it could be kept under control if policy makers maintained proper vigilance.

The NASA-DoD Relationship: Coordination Specifically

If there were few concrete results from the perceived rivalry and tensions existing between NASA and the DoD during Kennedy's term, Webb did at least create a special office called the Office of Defense Affairs (ODA) within NASA in November 1962. In charge until January 1968 was a retired admiral, W. Fred Boone. Officially, his duties, and those of his staff, were to ". . . strengthen the flow of technical and management information between NASA and the Department of Defense"¹⁸¹ and ". . . to improve working relationships between NASA and the DOD; to expedite the flow of information; and to promote coordination on matters of mutual interest."¹⁸² Unofficially, he was supposed to "take the heat off Seamans on the military interface."¹⁸³ The importance of Boone's office in policy making was relatively limited: one

¹⁷⁹ Kennedy, Memorandum for Johnson, April 9, 1963, *Exploring the Unknown, Volume I*, 468.

¹⁸⁰ Johnson, Report to the President, May 13, 1963, *Exploring the Unknown, Volume I*, 472.

¹⁸¹ NASA News Release No. 62-249, November 21, 1962, SPI document 1580, p. 1.

¹⁸² Webb, Memorandum for the Vice President, May 10, 1963, *supra*, 16.

¹⁸³ NASC staffer R.W. Hale. Memorandum for Welsh. Subject: NASA - Personnel, November 19, 1962, folder: National Aeronautics and Space Administration, box 22, RG 220, Records of the Na-

source posited, "As with the AACB, its establishment was more notable as an expression of policy than for any immediate accomplishment."¹⁸⁴ Nevertheless, the fact that Webb felt the need for such an organization existed does illustrate both the perception of tension that existed as well as the constant efforts to alleviate nascent rivalry through coordination at multiple levels and by numerous bodies (ODA, NASC, AACB, working-level committees).

Another overarching point about the NASA-DoD coordination efforts is that McNamara probably used the extensive body of agreements between OSD and NASA "as a check on the air force."¹⁸⁵ McNamara and Gilpatric both "wished to bring the services under tighter control." Such agreements were for Webb just as valuable because they "undercut the Air Force's attempt to take over the space program."¹⁸⁶ Chapter 4 described briefly the government report from 1965 that listed 88 separate "major" NASA-DoD agreements¹⁸⁷ and the comprehensive NASA accounting from 1967 that described 176 NASA-DoD accords.¹⁸⁸ A government accounting in 1965 determined that NASA, at the headquarters level alone, was involved in 203 interagency coordination and advisory bodies.¹⁸⁹ Obviously this dissertation is not the place for a description of each one. What is important, however, is the degree to which almost every possible facet of the NASA-DoD relationship was legalistically and contractually spelled

tional Aeronautics and Space Council, NARA, 1. Hale was quoting an unnamed source he had spoken with inside NASA.

¹⁸⁴ Levine, *Managing NASA*, 219.

¹⁸⁵ Lambright, *Powering Apollo*, 91.

¹⁸⁶ Levine, *Managing NASA*, 18. Although as discussed earlier in this chapter it is debatable whether or not there was an organized, high-level USAF attempt to take over NASA during the Eisenhower-Kennedy interregnum, this does not negate the fact that Webb could have been concerned about rumors or perceptions of such an attempt and taken measures to counteract it.

¹⁸⁷ *Government Operations In Space*, supra, 123-132.

¹⁸⁸ NASA, Inventory of NASA Interagency Relationships, October 13, 1967, folder: Copies of Agreements, DoD subseries, Federal Agencies series, NHDRC.

¹⁸⁹ *Government Operations in Space*, 101. Some, but not a significant proportion, of these would have been with other agencies besides the DoD.

out.¹⁹⁰ Zuckert referred to “a numerous series of peace treaties between NASA and ourselves [USAF]”¹⁹¹ while another source said, “Much of the cooperation between NASA and DOD occurs on the basis of formal written agreements, somewhat suggestive of treaties between sovereign powers.”¹⁹²

While some may dismiss this proliferation of bodies, committees, boards, panels and groups as inevitable bureaucratic accretion, it did ensure that despite the delicacy and potentially explosive nature of NASA-DoD relations, “There has never been a disagreement that could not be resolved by the Administrator and the Secretary of Defense.”¹⁹³ McNamara concurred and added, “. . . because we have two agencies, and because it is difficult to categorize in advance the project is either civilian or military, and yet because we have the two agencies, we have to assign management responsibility to one or the other, it means there must be a rather formal and really quite an intricate relationship between these agencies, and that is what we are building up.”¹⁹⁴ Therefore, Hugh Dryden explained that the emergence of the AACB in the spring of 1960 (see chapter 4) was not the be-all and end-all of the NASA-DoD coordination process. He said it was “only one of the channels for coordination. . . not all questions and problems relating to the activities of DOD and NASA of mutual interest to both will be resolved as a result of consideration

¹⁹⁰ This process extended down to the most minute detail. NASA and the DoD each had representatives on nearly 100 interagency committees and working groups such as the Gas Lubricating Bearing Advisory Group. Vernon Van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana, IL: University of Illinois Press, 1964), 205. Other representative samples of the intricate NASA-DoD coordinating process would be the Tri-Service Working Group on Solid Propellants, the NASA-DoD Space Science Committee, the NASA-DoD Working Group on Planetary Observatories, the DoD-NASA Wind Tunnel Study Group, and the Large Solid Motor Technical Assessment Committee. These particular examples, of which scores more could be listed, are from an internal Air Force document, USAF/NASA Coordination in Space Problems, March 16, 1961, contained in *Briefing Book for Air Force witnesses before the House Committee on Science and Astronautics on the Subject of DOD Space Directive 5160.32, K160.8636-4, AFHSO, 1961.*

¹⁹¹ Oral history interview of Zuckert, July 25, 1964 from *The John F. Kennedy Presidential Oral History Collection*, supra, 125.

¹⁹² Van Dyke, *Pride and Power*, 204.

¹⁹³ DDR&E Brown, to the House space committee, 1962, cited in Stephen I. Grossbard, *The Civilian Space Program: A Case Study in Civil-Military Relations* (Ph.D. dissertation, University of Michigan, 1968), 167.

¹⁹⁴ McNamara, testimony to the Senate Armed Services Committee, January 22, 1962, excerpted in *Air Force Information Policy Letter, Supplement for Commanders, Special Issue: Military Mission in Space, 1957-1962*, supra, 18.

of the matter by the Aeronautics and Astronautics Coordinating Board. Some matters are handled directly by the Administrator and the Secretary of Defense; others are settled at the level of the managers of specific programs and projects."¹⁹⁵ The AACB remained, however, the most visible symbol of NASA-DoD coordination. About it McNamara concluded, "The functions and work of this Board provide one of the best examples of continuing and effective cooperation between Government agencies engaged in parallel and interacting fields of activity."¹⁹⁶

A Case Study: Launch Vehicles and the Large Launch Vehicle Planning Group (LLVPG)

The functions of and subjects addressed by the myriad coordinating bodies, groups, boards, panels, and committees were as varied as the organizations themselves. Any kind of a full accounting would take literally volumes. One area that was particularly important because of its direct applicability to the human spaceflight projects was the coordinating effort concerning launch vehicles. In fact, coordinating the NASA and DoD launch vehicle families was one of the first matters to which Webb and McNamara turned their attention. By February 14, 1961, Webb and Gilpatric signed an agreement stating, "It is hereby agreed that neither the DoD nor the NASA will initiate the development of a launch vehicle or booster for space without the written acknowledgment of the other agency that such a development would be deemed consistent with the proper objectives of the National Launch Vehicle Program."¹⁹⁷ It was hoped this would ensure there would not be a proliferation of launch vehicles, with the attendant cost escalation.

Carefully coordinating the national fleet of launch vehicles developed by NASA and DoD became even more important just three months later with Kennedy's lunar landing decision. An entirely new and larger class of vehicle would be required to launch humans and their associated equipment to the moon

¹⁹⁵ Dryden, Statement to the House Committee on Science and Astronautics, May 17, 1962, folder: Aeronautics and Astronautics Coordinating Board, box: Aeronautics and Astronautics Coordinating Board, NHDRC, 4-5.

¹⁹⁶ McNamara, to the Senate Armed Services Committee, 1963, cited by Van Dyke, *Pride and Power*, 202.

¹⁹⁷ Webb and Gilpatric, Joint Memorandum, National Launch Vehicle Program Summary, February 14, 1961, SPI document 26, cover letter, 1.

and ensure their safe return. While the vehicle that would eventually be built to do this was called the Saturn V, it was in fact not a direct descendant of the vehicle that had been worked on and accelerated during the Eisenhower administration. Certainly there were technological elements present in the Saturn V descended from the initial work performed by Von Braun's team at ABMA and then the Marshall Space Flight Center. But the Saturn V was really closer in configuration and characteristics to the Nova vehicle that NASA and PSAC had speculated about in the latter stages of the Eisenhower administration.

The LLVPG's antecedents are found in a Webb letter to McNamara in July 1961. Webb said that, given NASA's new responsibilities in Apollo, "formulation of detailed planning for the specification and development of large launch vehicles consistent with both NASA and DOD objectives" was imperative. He proposed NASA and DoD establish a joint LLVPG to accomplish this task. It would be directed by Nicholas E. Golovin, Technical Assistant to the Associate Administrator of NASA; its deputy director would be Lawrence Kavanau, Special Assistant to the DDR&E for Space. The LLVPG would report to the NASA Associate Administrator Seamans and Deputy DDR&E Rubel.¹⁹⁸ The foundation for Webb's letter to McNamara was a proposal Seamans had made to Webb (dated the same day as Webb's letter to McNamara) to establish the LLVPG. Seamans more clearly described exactly what the LLVPG was to accomplish: "To determine the large launch vehicle configurations and operational procedures which will best meet the needs of the DOD and NASA." The LLVPG was to not only specify the particular configuration of the vehicles required to travel to the moon, it was also to determine the "operational procedures" necessary to do so: in spelling out the guidelines the LLVPG should consider in designing the launch vehicles, Seamans stated, "Both direct ascent and rendezvous options should be considered."¹⁹⁹ The

¹⁹⁸ Webb, letter to McNamara, July 7, 1961, folder: Webb correspondence, 1961, Webb subseries, Administrators series, NHDRC, 1.

¹⁹⁹ Seamans, Memorandum to Webb, Planning of a DOD-NASA Program for Development of Large Launch Vehicles, July 7, 1961, folder: AACB Minutes & Reports, box: Arnold Levine, Selected Sources from the author, NHDRC, 2. The most likely scenario to explain the simultaneous dates is that Seamans prepared a package for Webb that included not only Seamans' memo but also a letter to McNamara already drafted and ready for Webb's signature and transmission. "Direct ascent" is a reference to one theory on how best to reach the moon: a gigantic multistage rocket would be launched from the earth's surface and after jettisoning its spent stages proceed to the moon. Retrorockets would slow its descent to the lunar surface. After completion of lunar exploration, the remaining stages would be reignited and the astronauts would proceed back to earth. A truly mammoth vehicle would be required for this mode. "Rendezvous options" referred to another theory (usually termed earth orbit rendezvous

LLVPG was to operate under the AACB's Launch Vehicle Panel. The tasking to determine operational procedures is important because the assessment that the LLVPG essentially failed rests on the fact that it not only did not recommend a specific vehicle configuration, it also did not outline a particular operational mode for reaching the moon.

A memo from Golovin acknowledged Seaman's tasking memo of July 7, described the LLVPG's 15 members, said the LLVPG had had its first meeting on July 24, 1961, and that it expected to complete its work by November 1, barring any "substantial changes."²⁰⁰ While the summary volume of the LLVPG's final report has been declassified, little else has been.²⁰¹ However, speculation in the trade press by September 1961 said, "Bitter controversy is understood to be raking the top policy group charged with working out a national space vehicle program." *Missiles and Rockets* speculated that the LLVPG was divided over the relative merits of solid versus liquid fueled big boosters and that DoD representatives were complaining that the deliberations were wasting time that should be spent getting the lunar program initiated because "the problems involved in building lunar rockets already have been studied to death."²⁰² Golovin's personal diary does indicate significant dissension between NASA and DoD representatives concerning the DoD's proposal of the Titan III as the DoD's next generation heavy lift booster.²⁰³ NASA

(EOR)) whereby relatively smaller, multiple, and separate rockets would be launched into earth orbit, rendezvous for assembly, and then proceed on to the moon, whereupon much the same procedure outlined above would take place. The actual mode selected for and used in the Apollo program was a third, hybrid option: lunar orbit rendezvous (LOR). In it a large rocket, but not as huge as envisioned for direct ascent, would blast off, leave the earth's atmosphere, jettisoning spent stages as necessary. However, only a small Lunar Excursion Module (LEM) would descend to the lunar surface. After exploration, and even smaller subsection of the LEM would lift off from the lunar surface, rendezvous and dock with the Command Module in orbit above the moon, and proceed back to Earth. For a full explanation see James R. Hansen, *Enchanted Rendezvous: John C. Houbold and the Genesis of the Lunar-Orbit Rendezvous Concept*, Monographs in Aerospace History Series # 4 (Washington, DC: NASA, December 1995).

²⁰⁰ Nicholas Golovin and L. Kavanau, Memorandum to the Launch Vehicle Panel of the AACB [of which Seaman was Co-Chairman], August 31, 1961, folder: AACB Minutes & Reports, box: Arnold Levine, Selected Sources from the author, NHDRC, 1, 5.

²⁰¹ The author requested both agencies take declassification actions. No response was forthcoming by December 1996.

²⁰² "Policy Split Over Boosters Reported," *Missiles and Rockets* (September 18, 1961): 94.

²⁰³ The basic configuration of the Titan III was that a standard liquid-fueled Titan II USAF ICBM would have attached to it to large solid-fueled rocket engines, one on each side of the liquid-fueled core. This meant, of course, that the standard Titan II ICBM serving as the vehicle's core would have to

representatives apparently believed such a vehicle would be redundant to the launcher that would take Apollo to the moon, soon-to-be known as Saturn.²⁰⁴ In another entry Golovin records a lunch meeting with his deputy Kavanau, who in turn reported, "McNamara had told him [Kavanau] that the Air Force had railroaded through the Titan III recommendation by the LLVPG."²⁰⁵ Seamans recalled that the DoD introduced the Titan III question into the LLVPG only late in the summer, in part "... related to Rubel's very great concern that the Saturn would never work. . . . You get a tremendous 'flexing of interests,' in effect the DOD wanted us to endorse the Titan III. . . . And we weren't just about to endorse it."²⁰⁶

By November, NASA was already proposing an internal group that would make "a finer cut of the Golovin recommendations" that would be "more specific with regard to the content and emphasis of a program." Apparently NASA felt the LLVPG would not soon be recommending a concrete large launch vehicle program that would: "1. Meet the requirements of manned space flight, and 2. Have broad and continuing national utility (for other NASA and DOD missions)" and that NASA would have to consider unilaterally making such a determination such a determination for the specific vehicle for Project Apollo.²⁰⁷ The tentative nature of the LLVPG's conclusions was evident in an AACB Launch Vehicle Panel meeting of January 5, 1962. Golovin briefed the LLVPG's preliminary conclusions: "The Group was of the opinion that earth orbit is probably the best approach from the point of view of reliability and human safety but that the lunar orbit might be attained earlier. The Group concluded that no specific ap-

be substantially modified to be able to withstand the added weight and thrust of the solid-fueled additional engines.

²⁰⁴ Nicholas Golovin, Chronological File Entry for October 30, 1961 (among others), folder: Chronological file, July - September 1961, box 6, Nicholas Golovin papers, LoC. 1.

²⁰⁵ Nicholas Golovin, Chronological File Entry for November 22, 1961, *ibid.*, 1.

²⁰⁶ Oral history interview of Seamans, May 26, 1966, folder: Gemini interview, Seamans subseries, Deputy Administrators series, NHDRC, 3-4.

²⁰⁷ Milton Rosen, OMSF Director of Launch Vehicles and Propulsion, Memorandum to D. Brainerd Holmes, Director, OMSF, Large Launch Vehicle Programs, November 6, 1961, SPI document 1597, 1-2.

proach should or could be selected at this time and established three classes of boosters according to required payload placement capabilities."²⁰⁸

The LLVPG's final report was not published until September 1962, over a year after the group's first meeting of what it thought would be a ninety-day project. Its principal recommendations did little to clarify the large launch vehicle situation and seemed to provide little concrete basis from which to plan America's future family of large launch vehicles. Golovin's recommendations basically said to develop everything that was currently being considered, and more: the Saturn C-1; the Titan III; the Saturn IVB; a new vehicle called the class B vehicle. Concerning the specific mission mode, the same pattern prevailed: the LLVPG recommended making a major engineering effort to develop both the earth orbit and the lunar orbit techniques as approaches for the lunar landing mission but also to concurrently develop the direct ascent capability.²⁰⁹ In the end, as Seamans stated, the LLVPG involved "a lot of churning around, a lot of effort expended,"²¹⁰ but with few final or definite recommendations from which to proceed. One NASA history concluded, "Golovin's group did get mired in the mode issue, leaving the choice of an Apollo launch vehicle still unsettled. . . . Once again nothing was settled. . . . The committee's conclusions - or lack of them - reflected compromises and conflicting opinions."²¹¹ Another NASA source concurred, stating that when the LLVPG finished its work, "Too many questions remained open, too many answers equivocal, pleasing neither NASA nor Defense, and the committee had failed to produce the integrated national launch vehicle program it had been created for."²¹²

²⁰⁸ Minutes of the 9th Meeting of the Launch Vehicle Panel of the AACB, January 5, 1962, folder: AACB Minutes & Reports, box: Arnold Levine, Selected Sources from the author, NHDRC, 2.

²⁰⁹ LLVPG, Summary Report: NASA-DoD Large Launch Vehicle Planning Group, September 24, 1962, reprinted Logsdon et. al, *Exploring the Unknown, Volume II*, supra, 318-337.

²¹⁰ Oral history interview of Seamans, December 15, 1988, NASM, 389.

²¹¹ Courtney G. Brooks, James M. Grimwood, Loyd S. Swenson, Jr., *Chariots for Apollo: A History of Manned Lunar Spacecraft*, NASA SP-4205 (Washington, DC: USGPO, 1979), 48-49.

²¹² Barton C. Hacker and James M. Grimwood, *On the Shoulders of Titans: A History of Project Gemini*, NASA SP-4203 (Washington, DC: USGPO, 1977), 68.

As in so many questions of space policy, Logsdon ably summarized the LLVPG bottom line: "Despite these analyses and the extensive efforts of the LLVPG, the group reached the end of the study with a relatively large number of critical questions unresolved. As a result, the LLVPG recommendations were somewhat of a compromise and did not provide the basis for the development of an integrated national launch vehicle program, based on a 'building block' program, as had been hoped."²¹³ Another space scholar concurred and added that in the LLVPG process "... the different requirements and institutional interests of NASA and the DoD became clear. Both agencies distanced themselves from the contents of the report." By the time of the report's release in September 1962, "... it had been obvious for some time that there would be little cooperation between NASA and the DoD on large launch vehicles. The result was a further solidification of entirely separate and redundant rocket development programs in the civil and military spheres."²¹⁴ The LLVPG case study serves to illustrate that despite the extensive network of NASA-DoD coordination efforts, there did not automatically result from them a smoothly efficient and intricately meshed national space program. Institutional interests and personality conflicts still played a part in a coordinating process involving two extremely large bureaucracies that was at times successful and at times a failure.

The NASA-DoD Relationship: Support Specifically

The type and nature of support that the DoD, particularly the Air Force, provided NASA during the Eisenhower administration (described in chapter 4) continued under Kennedy. Nevertheless, there was in some areas a greater movement toward independence. For instance, while the Air Force continued to supply launch vehicles in the sense of converted Atlas and Titan ICBMs for the Mercury and Gemini programs respectively, NASA would construct its own Saturn family of launch vehicles for Apollo. The Air Force continued to provide hundreds of officers for transfer to NASA but began to bristle at some

²¹³ John Logsdon, *NASA's Implementation of the Lunar Landing Decision* (Washington, DC: NASA HHN-81, August 1969), 33.

²¹⁴ Dwayne A. Day, "Invitation to Struggle: The History of Civilian-Military Relations in Space," in John M. Logsdon et. al., *Exploring the Unknown, Volume II*, 258-59.

NASA personnel requests. Finally, the area of exactly how much NASA would reimburse the Air Force for the multitude of services it provided NASA emerged during the early 1960s as a contentious issue.

The Air Force supervised and administered many of NASA's contracts for hardware procurement. That meant that NASA did not have to station contract administrators across the country; the contracts would simply be handled by the pre-existing nationwide network of Air Force Systems Command (AFSC) procurement officers. However, as NASA's budget mushroomed after Kennedy's lunar landing decision, the demand on these officers correspondingly grew. AFSC reported by August 1961 that Air Force manpower used to administer NASA contracts was "taken out of the hide" of its officer corps and that, "Support of regular Air Force programs plus a vital role in the site activation of Atlas, Titan and Minuteman missiles have strained our manpower resources to the breaking point. Additional requirements without increased manpower authorizations can only result in a diluted contract management effort."²¹⁵ Though NASA continued to use the DoD regulations and procedures for procurement and contract administration, it began to assume more and more of the burden of administering its own contracts. This is an example of how, over the course of time, NASA moved away from an overt dependence on the military and toward a greater institutional and bureaucratic independence. The same trend held true in many other areas.

The Air Force provided such a preponderance of the DoD support to NASA that McNamara in February 1962 issued DOD Directive 5030.18, Department of Defense Support of the National Aeronautics and Space Administration, that officially declared, "It is in the national interest for the Department of Defense, to the extent compatible with its primary mission, to make its resources available to NASA, in the form of facilities and organizations, in order to employ effectively the nation's total resources for the achievement of common civil and military space objectives." The Directive also made clear, "Except as the Secretary of Defense may otherwise direct, the Secretary of the Air Force is assigned responsibility for the research, development, test and engineering of satellites, boosters, space probes, and associated sys-

²¹⁵ Carl Sidders and Robert Bickett, *Air Force Support of Army, Navy and NASA Space Programs*, a paper prepared by the Office of Information, Western Contract Management Region, AFSC, August 29, 1961, folder: NASA/DOD Cooperation/Space Merger?, DoD subseries, Federal Agencies series, NHDRC, 9.

tems necessary to support specific NASA projects and programs arising under basic agreements between NASA and DOD.²¹⁶ What had been *de facto* true was now *de jure* established: the Air Force was the primary provider of DoD support to NASA, though of course still subject to OSD supervision and control. It illustrated the trend described earlier this chapter whereby McNamara encouraged centralization of military space responsibilities under the Air Force, probably so that OSD could tightly manage military space affairs. AFSC responded to this Directive by establishing within NASA headquarters a new position: AFSC Deputy Commander for Manned Space Flight, Major General Osmond J. Ritland. Ritland was responsible for the direct USAF/AFSC-NASA interface, most of which dealt with human spaceflight, and for coordinating the Air Force's support to NASA.²¹⁷

A Key Issue: Personnel

Perhaps the most valuable type of support the Air Force provided NASA was assigning talented managers from its pool of officers to NASA. The total number of military officers assigned to NASA will be recalled from chapter 4:²¹⁸

<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
66	67	77	117	161	239	249	280	323	318	317	268

From 1966 on the number leveled off and gradually declined because NASA had existed long enough to begin to develop its own pool of experienced and capable managers. In addition, "... from 1966 on positions were not filled with detailees until a reasonable effort had been made to obtain a civilian." But for ten years from NASA's inception Air Force personnel filled a managerial void in NASA with individuals that NASA could have obtained from no other source: Air Force officers were the only class of individu-

²¹⁶ Department of Defense Directive 5030.18, Department of Defense Support of the National Aeronautics and Space Administration, February 24, 1962, folder: DOD Space Policy, DoD subseries, Federal Agencies series, NHDRC, 1-2.

²¹⁷ Major General R.M. Montgomery, Assistant Vice Chief of Staff, Memorandum to multiple USAF recipients, Air Force Implementation of DOD Directive 5030.18, April 23, 1962, IRIS 1003001, AFHSO, 1-2.

²¹⁸ Jane Van Nimmen, Leonard C. Bruno, Robert Rosholt, *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 80ff. 1969 figure from Ihor Gawdiak and Helen Fodor, *NASA Historical Data Book, Volume II: NASA Resources, 1969-1978*, NASA SP-4012 (Washington, DC: USGPO, 1994), 68.

als experienced in initiating, developing, and managing large aerospace projects.²¹⁹ Seamans wrote USAF Chief of Staff White early in the Kennedy era. "We [NASA] are benefiting tremendously from the generous exchange of Air Force personnel now engaged in our projects."²²⁰

In 1963 a NASA official wrote Webb that the Air Force personnel working for NASA had made it "... possible for NASA to obtain the services of many fine officers with skills and experience not obtainable from other sources. The cooperation on the part of the Department of Defense has contributed materially to the success of NASA's efforts." In fact, this official urged Webb to try to modify the agreements with the DoD so that these officers could serve significantly longer than the normal three-year tour of duty with NASA.²²¹ Webb confirmed to NASC Executive Secretary Welsh that Air Force personnel "... possess certain skills and experience which are not available to NASA from any other source" and if they were ever withdrawn, this "... would create a situation in the NASA manning structure which would seriously disrupt the momentum of the national space program."²²² In fact, NASA internally expressed concern that elements within NASA were trying too hard to "recruit" military personnel to apply for transfers to NASA. NASA's Executive Officer wrote to the NASA Personnel Director that NASA's facility in Cleveland, the Lewis Research Center, had been urging "... interested military personnel, such as graduating seniors in ROTC programs, to write to Lewis Research Center if they want to be assigned for work there. . . . it seems to me that LRC is misinterpreting the spirit and intent of the NASA-DOD agreement. . . . I do not think it should be interpreted as a license for NASA to proselyte service personnel

²¹⁹ Levine, *Managing NASA in the Apollo Era*, 121-22.

²²⁰ Seamans, letter to Thomas White, February 28, 1961, folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas White papers, LoC, 1.

²²¹ Albert F. Siepert, Memorandum to Webb, Length of Tours of Certain Military Detailees, February 8, 1963, *Exploring the Unknown, Volume I*, 673-74.

²²² Webb, Letter to Edward C. Welsh, May 7, 1963, folder: NASC 1962-1972, box: White House, National Aeronautics and Space Council, NHDRC, 1.

on a wholesale basis. If the Lewis announcement comes to the attention of the military departments, it can prove embarrassing to NASA."²²³

Perhaps the most important single individual the Air Force loaned to NASA was Brigadier General Samuel Phillips. The individual responsible for this was new OMSF Director George Mueller. Mueller had worked for the Space Technology Laboratory of the TRW Corporation in the 1950s when it was heavily involved with providing systems integration for the USAF's ballistic missile effort. During the late 1950s Phillips was the Program Director for the Air Force's Minuteman ICBM and impressed Mueller with his performance. One of Mueller's first acts after arriving at NASA/HQ in September 1963 and surveying the situation was to write Webb and urge even greater integration of skilled Air Force personnel at even higher levels within NASA. Mueller explained that "... the management of the very large contracts which are characteristic of the lunar program requires a set of skills and background experience which are not now a part of the present and past NASA structure." The solution was "... that the national interest would be best served if we could bring to bear upon the management of the lunar program some of the specific program management experience and skills which were developed in the Department of Defense during the conduct of the Polaris, Atlas, Titan and Minuteman development programs." Further, Mueller explained

I have thought that the actual Air Force ballistic missile program management experience would be most appropriate. . . . I believe the Air Force experience would be most valuable to us, and it would fill what I believe to be our greatest void of capability. It is particularly worth noting that the Air Force, over a period of years, has developed the capability of managing and controlling the very contractors upon whom we have placed our primary dependence for the lunar program.

Mueller closed by mentioning Phillips as a perfect candidate to direct the Apollo program under Mueller's supervision as OMSF Director.²²⁴

²²³ R.P. Young, NASA Executive Officer, letter to Director of Personnel Lacklen, Proselytizing of Military Personnel, September 10, 1963, folder: Military Personnel Detailed to NASA, DoD subseries, Federal Agencies series, NHDRC, 1.

²²⁴ George Mueller, Deputy Associate Administrator for Manned Space Flight, letter to Webb, Utilization of Air Force Program Management Personnel, September 26, 1963, folder: 1964, Manned Lunar Landing Program, box 43, Samuel Phillips papers, LoC, 1-3.

In December Webb officially requested Phillips' transfer to NASA stating, "We do not have with NASA people with the requisite background in program management, nor have we been able to find in industry available people, qualified to carry out these responsibilities." Webb said Phillips was "uniquely qualified to carry out the responsibilities" of Apollo Deputy Program Director and that "his talent is not available either within NASA or in industry."²²⁵ The Air Force immediately complied with Webb's request and Phillips reported to NASA on December 31, 1963. After a brief stint as Deputy Director, Phillips served as Apollo Program Director from October 1964 through the first lunar landing in July 1969 and until September 1969, exercising direct and day-to-day management and control over America's drive to the moon. He later became a four-star Air Force general. Referring to Phillips and the other Air Force officers, Seamans said, "I don't know if we could have done the project without them."²²⁶ Secondary sources agree, stating that in Project Apollo, "...the Air Force influence was pervasive, from the Headquarters level on down."²²⁷

One joint Mueller/Phillips contribution in particular stands out as key to Apollo's success within the decade of the 1960s. The prevailing theory at NASA concerning how to test space launchers with their numerous subsystems and assemblies derived from the methodical work of Wernher von Braun and his German rocket scientists working at NASA's Marshall Space Flight Center. They tested virtually every item connected with the rocket and its spacecraft separately "and with painstaking detail." This German model meant "long sequences of launches testing various parts of the Apollo configuration in space."²²⁸ The alternative that the Air Force had developed in its ballistic missile program under Schriever et. al. was called "all up" testing. In it a number of components were tested together and launched together as complete systems, thereby eliminating many tests. As Phillips explained, "In the simplest terms, the all up concept means build it all and fly it in its final configuration the first time you

²²⁵ Webb, letter to Zuckert, December 11, 1963, *ibid.*, 1-2.

²²⁶ Oral history interview of Seamans, December 15, 1988, NASM, 398.

²²⁷ Roger Bilstein, *Stages to Saturn: A Technological History of the Apollo-Saturn Launch Vehicles*, NASA SP-4206, (Washington, DC: USGPO, 1980), 289.

²²⁸ Lambright, *Powering Apollo*, 116-117.

fly it. . . . it very clearly is the concept that had been established and used in the Minuteman program.”²²⁹ Phillips and Mueller discovered that the Apollo program was structured in accordance with the laborious and time-consuming stage-by-stage testing method. Further, if this tactic was followed, America would not reach the moon by the end of the decade. They boldly ordered that the Saturn V be tested “all up” with all its stages and the spacecraft in working order on the first test flight.²³⁰ Without this time compression generated as a result of the “all up” decision, it seems unlikely that NASA could have reached the moon by the end of the decade, especially considering that the tragic fire that killed three Apollo astronauts on January 27, 1967 caused more than a year-long delay in the flight test program.²³¹

DoD’s level of assistance, especially its personnel support to NASA, was in fact so extensive and so key to NASA’s success that some individuals were convinced there had to be a conspiracy whereby the Air Force was quietly infiltrating NASA in an attempt to take it over from the inside. R. Cargill Hall explained, “Liberal canting underscored the improved relations. So many Air Force line officers held management positions in NASA, those on the left declared, that the nation’s space program was now being militarized from the inside out.”²³² Whatever the case, Air Force personnel indisputably made a vital contribution to NASA’s success in the 1950s and 1960s.

Money Trouble?

Within the general topic of DoD support to NASA, there was one problem area which started to emerge during the Kennedy administration but did not blossom into a seriously contentious issue until the Johnson era. This area was: exactly how much would NASA reimburse the DoD for DoD’s services rendered? It will be recalled from chapter 4 that the November 1959 agreement on this subject basically

²²⁹ Oral history interview of Phillips, July 22, 1970, Phillips file, Biographical series, NHDRC, 25-25.

²³⁰ Ibid., 27-28; R. Cargill Hall, “Project Apollo in Retrospect,” in *Blueprint for Space* (Washington, DC: Smithsonian Institution Press, 1992), 158; Lambright, *Powering Apollo*, 117-18.

²³¹ Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 87-88.

²³² R. Cargill Hall, “Civil-Military Relations in America’s Early Space Program,” a paper delivered September 21, 1995 at a symposium sponsored by the Air Force Historical Foundation, “The USAF in Space: 1945 to the Twenty-First Century,” Andrews AFB, MD, 15.

stated that if the DoD received an order from NASA which the DoD had to then subcontract out, NASA would only have to reimburse the direct cost of the subcontract; there would be no overhead or administrative charges. If the DoD had the capability to fulfill the contract at one of its facilities, NASA's costs would be limited to the costs directly attributable to performance of the contract; there would be no charges for depreciation, rent, overhead, etc.²³³

Several thorny questions arose during the Kennedy presidency. Perhaps the stickiest was how was DoD to separate the costs peculiar to NASA programs, particularly at Cape Canaveral/AMR, from the total cost of running the range? McNamara began to insist on cost sharing of common expenses, contrary to the November 1959 agreement. NASA replied that if it had to pay on a cost sharing basis, it wanted a management voice commensurate with its share of the funding of common overhead expenses; since AMR (renamed Eastern Test Range or ETR during the Kennedy administration) was a national range used by several agencies it was not practical to charge each agency on a cost sharing basis. This question was negotiated, discussed, renegotiated, and rediscussed without successful resolution until finally NASA and the DoD referred it to the BoB Director in 1967 for arbitration.²³⁴ The reimbursement question will therefore be discussed primarily in the context of the Johnson administration, chapter 9. Boone expressed the central difficulty: "There was no sound, simple method by which a reasonably accurate estimate of a NASA share of range costs could be made, primarily because the accounting procedures in effect were inadequate to permit making a breakdown of costs associated with the individual segments of workload. Those areas in which direct NASA and DOD costs could be identified constituted only a very small percentage of the total workload and costs."²³⁵ Seaman's said the whole complicated reimbursement issue boiled down to "a mare's nest of accounting."²³⁶

²³³ DoD, *Agreement Between the Department of Defense and National Aeronautics and Space Administration Concerning the Reimbursement of Costs*, November 12, 1959, in Logsdon et. al., *Exploring the Unknown, Volume II*, 293-96.

²³⁴ Levine, *Managing NASA*, 222-23.

²³⁵ Boone, *NASA Office of Defense Affairs*, 126.

²³⁶ Oral history interview of Seamans, December 15, 1988, NASM, 384.

Mercury and DoD Support of Mercury

NASA's official history lists a figure of \$384 million for the total cost of Project Mercury.²³⁷ Its two ballistic parabolic flights and four orbital flights ended with L. Gordon Cooper's flight aboard MA-9, Faith 7, on May 16, 1963. The DoD's integral role in Mercury (described in chapter 5) involving providing everything from the astronauts to the launch vehicles, from the launch facilities to the recovery forces. In return, "Providing support to MERCURY flights has contributed greatly to the Department of Defense's knowledge and experience in areas of launch, network, recovery, communications, and medical space operations. Future space-flight operations can be effectively supported by applying the experience and procedures derived during Project MERCURY."²³⁸ A representative sample of some components of DoD Mercury support shows that for Cooper's flight the DoD provided 28 recovery ships, 171 aircraft, and 18,000 people serving in various capacities.²³⁹ The DoD had to support 32 planned landing areas and 51 contingency landing areas for this final Mercury mission.²⁴⁰

The USAF reaffirmed its commitment to continued post-Mercury support after Kennedy greatly expanded NASA's responsibilities with Apollo. Zuckert wrote Webb, "I would like to again reaffirm the Air Force intention to provide the maximum possible assistance to NASA in the discharge of its important responsibilities for this program [Apollo]."²⁴¹ In October 1961 NASA and DoD would work out a detailed, 40-page document specifying exactly how the DoD would support the lunar landing program. It had separate sections on what the DoD would contribute in: Management; Budgeting and Funding; Procurement and Contracting; Bioastronautics; Technical Support; Global Communications and Instrumen-

²³⁷ Swenson, et. al., *This New Ocean*, 508.

²³⁸ Major General Leighton I. Davis, DoD Representative for Project Mercury Support Operations, Report submitted to the Secretary of Defense, *Summary Report: DOD Support of Project Mercury, July 1959 - June 1963*, September 11, 1963, folder: DOD Support of Mercury, Mercury series, NHDRC, 78.

²³⁹ Congress, House, Committee on Science and Astronautics, Subcommittee on NASA Oversight, *The NASA-DOD Relationship*, Report, 88th Congress, 2nd Session, 1964, p. 8.

²⁴⁰ Davis, *DOD Support of Project Mercury*, 26.

²⁴¹ Zuckert, letter to Webb, August 25, 1961, IRIS 1003003, AFHSO. 1. The program intervening between Mercury and Apollo was Project Gemini. It was not officially approved until December 1961 and so Zuckert could not have included it in his pledge for continued Air Force post-Mercury support.

tation: Technical Facilities: Range Operations: Civil Engineering: Logistical Support: Personnel: Public Information: Technical Information: and Foreign Technical Data. This agreement concluded. "Integration of effort, rather than competition is mandatory." One of DoD's goals was, "Shaping the MLLP [Manned Lunar Landing Program] as feasible to expedite the attainment of basic military capabilities to operate in space."²⁴²

Of the almost \$400 million total cost of Mercury the DoD provided support in the amount of \$133 million, or almost a third of the project's budget, of which NASA reimbursed \$100 million.²⁴³ A breakdown of this \$133 million shows, in millions of dollars:²⁴⁴

<u>Service</u>	<u>Reimbursed</u>	<u>Absorbed</u>	<u>Total</u>
USAF	83.8	10.4	94.2
Navy	12.2	19.8	32.1
Army	2.3	.7	3.0
Bioastronautics (3 services)	1.5	2.4	3.9
Total	99.87	33.37	133.24

Therefore, not only did DoD personnel render valuable assistance to the NASA program, DoD physical resources such as ships, aircraft, and ICBMs converted to space launch vehicles also played a key role in the success of NASA's first human spaceflight project. Generally, the DoD absorbed the cost of approximately 25% of this physical assistance. These unreimbursed expenses help the historian understand McNamara's drive to establish the new cost sharing precedent for reimbursement described above.

²⁴² Roswell Gilpatric, Agreements for Support of Manned Lunar Landing Program, October 2, 1961, IRIS 1003003, AFHSO, 1, 4-5. One point occasionally mentioned concerning DoD and the Apollo program is that the DoD would have preferred NASA to select the earth-orbit rendezvous (EOR) method over the lunar-orbit rendezvous (LOR) method because EOR would develop the near-earth rendezvous and docking capabilities the DoD estimated would be crucial to missions such as satellite interception. When asked if DoD was upset when NASA chose LOR Seamans replied that Webb specifically asked McNamara to review the EOR vs. LOR question and make clear the DoD's preference: "They didn't even come up with anything that indicated that it made much difference to them." Oral history interview of Seamans, December 15, 1988, NASM, 390. Seamans told this author that when the OSD replied to NASA's question on OSD's preference for LOR vs. EOR, "In effect, they came back and said it's immaterial to us." Oral history interview, July 5, 1996.

²⁴³ Davis, *DoD Support of Project Mercury*, 2.

²⁴⁴ Swenson, et. al., 644-646.

The Reciprocal: NASA's Contributions to National Security?

In the Eisenhower administration NASA developed the idea that it was making a contribution to United States national security and the mission of the DoD because it was developing the infrastructure, vehicles, and experience required to operate in space. These capabilities and facilities could be used in times of national emergency. This proposition continued to be NASA's position under Webb, during both the Kennedy and Johnson administrations. Webb said in July 1961, "I think it would be a very brave man who would say that the capacity to operate with large, manned vehicles in space would have no military value."²⁴⁵ McNamara and the OSD did not seem to be in any rush to endorse this notion but they did not make any effort to publicly dispute it either.

Seamans explained, "There is an important interchange of components and vehicles between the NASA and DOD programs. United States mastery of space is essential insurance against finding ourselves with a technology inferior to that the Russians will develop as they press forward on the space frontier. If we allow them to surpass us, their space technology in its military aspects will be used to jeopardize our security."²⁴⁶ Dryden went so far as to declare that the lunar landing effort had two fundamental purposes: "(1) Insurance of the Nation against scientific and technological obsolescence in a time of explosive advances in science and technology; and (2) Insurance against the hazard of military surprise in space. The manned lunar exploration program constitutes essential insurance against finding ourselves with a position in the new technology inferior to that of a possible enemy."²⁴⁷ Finally, Webb often reiterated, "Our national security demands that we act to insure that no hostile power will use space as an unchallenged avenue of aggression against us. The scientific knowledge and technological skill developed

²⁴⁵ "Why Spend \$20 Billion to Go to the Moon?" interview with James Webb, *U.S. News and World Report* (July 3, 1961): 60.

²⁴⁶ Robert C. Seamans, Jr., Speech to the Aerospace Corporation, August 29, 1961, Defense Technical Information Center AD-B185 903, p. 5.

²⁴⁷ Hugh Dryden, Speech to the American Aeronautics and Astronautics Society, December 30, 1961, folder: NASC 1962-1972, box: White House, National Aeronautics and Space Council, NHDRC, 7-8.

in our program of lunar exploration will give us that assurance, and will form the basis for any military applications which the national interest may require."²⁴⁸

As part of his JFK-mandated review of the space program in 1963, Lyndon Johnson asked both Webb and McNamara to estimate how much of NASA's program was militarily useful. Webb replied, "All of it can be directly or indirectly militarily useful" because everything from launch vehicles to tracking stations "... can, in time of need be converted to, or can be utilized to handle military requirements All those [components] in the program could become indispensable elements of military power. . . . The capability to operate safely and reliably in space is necessary for military control. This capability is being developed both in space and on the ground through NASA programs." Webb concluded, "Therefore, as insurance against surprise and as the building of the necessary underlying capability, I believe this program is completely justified."²⁴⁹ In his reply to Kennedy Johnson basically endorsed and forwarded Webb's view on this particular question.²⁵⁰ Shortly thereafter, and only a few days before he was assassinated, Kennedy explained at a press conference that the United States was spending \$5 billion for the space program "... of which at least a good percentage has a military implication in the sense of national security."²⁵¹

McNamara's response to Kennedy, however, was not nearly as generous concerning the applicability of NASA's contribution to national security. He wrote that of NASA's budget, expected to be \$5.7 billion for FY64, only the following amounts in the listed categories "would be undertaken by DoD in the absence of a NASA program:" space research - \$20 million; exploratory and advanced development - \$100 million; Gemini-type program - \$150-200 million; mission applications such as meteoro-

²⁴⁸ Webb, Speech at the NASA-Industry Program Plans Conference, February 11-12, 1963, extracted in *The Military Mission in Space: A Selection of Published Views, August 1962-June 1963*, folder: Military Mission in Space, DoD subseries, Federal Agencies series, NHDRC, 86.

²⁴⁹ Webb, Memorandum for the Vice President, July 30, 1963, folder: Johnson - Declassified Space Correspondence, box: White House, Presidents, Johnson, Correspondence, NHDRC, 1-2, 4-5.

²⁵⁰ See Johnson's summary of his response to Kennedy in his memoirs, *The Vantage Point: Perspectives on the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), 282f.

²⁵¹ Kennedy, News Conference, November 14, 1963, *Public Papers of the President, 1963* (Washington, DC: USGPO, 1964), 847.

logical and communications satellites - \$25-\$50 million. McNamara specifically pointed out, "Most of the increase in the augmented NASA effort . . . reflects the lunar program directly and has no demonstrable military value. . . . based upon what we presently foresee, the Defense Department would not pay for the large augmented management and support effort, or any appreciable fraction of it, if NASA did not." McNamara's bottom line was that of NASA's requested FY64 budget of \$5.7 billion, "I have identified approximately \$600-\$675 million of NASA effort which appears to have direct or indirect value for military technology."²⁵²

Privately, McNamara was reportedly even more insistent that national security not be used as a major justification for NASA's space program. Seamans recalled that when Webb asked the OSD if the DoD had a preference between the EOR and LOR lunar mission modes, ". . . the answer came back, 'Look, we're responsible for national security. Sure, you've got your program, we've agreed to your program, but don't try to build it under the umbrella of national security.' Because if it had been otherwise, then McNamara would not have wanted it to be run by anybody other than the Department of Defense. McNamara was very clear on that."²⁵³ Webb was apparently cognizant of the fact that he could not push the national security justification of NASA's program too far or he would risk a more intrusive McNamara presence. Beyond the general statements cited above, Webb never clarified exactly how NASA's R&D was relevant to the DoD; he never progressed beyond saying NASA's abilities and facilities simply would be available for purposes of national defense. Webb later stated, "I never did want to particularly clarify that. . . . McNamara wanted to take the view that only the money that fed the projects under his control contributed to defense."²⁵⁴

²⁵² McNamara, Report to Lyndon Johnson, May 3, 1963, National Space Program, in Logsdon et al., *Exploring the Unknown, Volume II*, 342-347.

²⁵³ Oral history interview of Seamans, January 19, 1988, NASM, 260.

²⁵⁴ Oral history interview of Webb, October 15, 1985, NASM, 226.

While containing an element of exaggeration, there is also some truth to the statement, "By 1963, however, the Air Force needed NASA almost as much as NASA needed the Air Force."²⁵⁵ At a minimum, NASA began to achieve a degree of emancipation from the high levels of dependence it had on the DoD during the Eisenhower administration. During its first few years, NASA had no choice: DoD was the only organization which had the facilities, the experience, the managerial expertise, and the rockets NASA required to do its job. Over time, however, NASA would develop its own resources in each of these categories and began to move away from its close reliance on the DoD; this process started during the Eisenhower administration and gained momentum during Kennedy's. As one scholar explained, "While the Air Force's participation in NASA activities was consolidated during the Kennedy administration, its influence actually declined" because of the rapid increase in NASA appropriations following Kennedy's lunar landing decision. This decision not only increased NASA's political constituency but "sealed the primacy of NASA's manned space flight programme over the Air Force's."²⁵⁶

One must not take this too far, as did one scholar who declared, "The important point is that *the military and the civilian space programs are gradually being integrated into one plan, and NASA is becoming part of the evolving United States 'Space Force.'* . . . a combination of interagency politics and accounting maneuvers allows the Air Force increasing penetration into the space program without the nation's giving it a clear go-ahead. . . . [NASA is] an embryonic fourth military space service, sometimes rival, sometimes partner of the Air Force, in astronautical maneuvers in the capital."²⁵⁷ As is often the case, Arnold S. Levine represents a calmer and more rational perspective on NASA-DoD relations in general and for the Kennedy administration specifically:

The essence of the NASA-DoD relationship had far more to do with mutual need than with philosophical arguments concerning the existence or the desirability of one space program or two. . . . The principles underlying the U.S. space program resulted less

²⁵⁵ Levine, *Managing NASA in the Apollo Era*, 236. Levine was referring in particular to the fact that the Air Force frequently used such NASA facilities as its 16 different wind tunnels, its ground-based flight-motion simulator, and its 18.3 meter vacuum environmental sphere.

²⁵⁶ Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-1984* (Ithaca, NY: Cornell University Press, 1985), 61-62. See also *Government Operations in Space*, 135f. for a similar conclusion.

²⁵⁷ Amitai Etzioni, *The Moon-Doggle: Domestic and International Implications of the Space Race* (New York: Doubleday & Company, 1964), 136-37, 142. Etzioni's emphasis.

from anything enunciated in the Space Act than from President Kennedy's May 1961 decision to assign the lunar-landing program to NASA. But this decision was preceded by earlier moves by NASA and DoD officials and by Congress to prevent an Air Force takeover. . . . With the backing of the President and much of Congress and the acquiescence of McNamara, NASA, on the one hand, staked out its position as an independent agency while, on the other, waging a quiet behind-the-scenes battle with DoD to maintain that independence. . . . NASA would cooperate with the DoD, but never to the point of giving away its authority to meet its needs.

The history of NASA from its establishment to the mid-1960s can be charted in terms of NASA's ability to design its own programs, procure its hardware, and support its spacecraft without overt interference from the military.²⁵⁸

The goal of the next chapter will be to explain how the general principles of the NASA-DoD relationship set forth in this chapter came into play with the human spaceflight projects of Dynasoar, Gemini, and MOL.

²⁵⁸ Arnold S. Levine, "Management of Large-Scale Technology," in Alex Roland, editor, *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405 (Washington, DC: USGPO, 1985), 47, 50.

8. Programmatic Reorientation: Gemini, Dynasoar, and MOL

The competition with NASA had become a bedeviling problem for the Defense Department by 1963, particularly where the area of manned space was involved.¹

From 1958 to 1968, it was not a matter of defense and service secretaries conspiring with NASA to deprive the Air Force of its 'rightful place in space;' rather, it was a matter of civilian leadership obliging the wishes of the three presidents who had appointed them. Space was primarily the province of the civil-space agency created by Congress at the request of the first of these three men. . . NASA was created to do a job, it was doing that job with a minimum of fuss, and there really was no point in trying to overturn that arrangement.²

The Vice President mentioned that this Administration is trying to keep the top control of the [space] program in the hands of civilians in order to avoid a charge of war-mongering.³

The way they have the program [Dynasoar] now, it looks to me that in about 1965 or 1966 you will have a sub-orbital roller coaster ride.⁴

From 1962 until the program [Dynasoar] was canceled, it experienced an almost continuous series of perturbations.⁵

This chapter will attempt to delineate the complex relationship between the three primary human spaceflight projects of the Kennedy administration that were relevant to the NASA-DoD relationship: Gemini; Dynasoar; and the Manned Orbiting Laboratory (MOL). The first step will be to briefly de-

¹ Congress, House, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*, Thirteenth Report, 89th Congress, 1st Session, House Report No. 445, June 4, 1965, p. 80.

² Gerald T. Cantwell, *The Air Force-NASA Relationship in Space, 1958-1968* (Washington, DC: Department of the Air Force, Office of Air Force History, October 1971, reprinted November 1990), iii.

³ NASC, Summary of NASC Meeting, July 31, 1963, folder: NASC meeting July 31, 1963, box 3, RG 220, Records of the National Aeronautics and Space Council, NARA, 3.

⁴ Undersecretary of the Air Force Joseph V. Charyk, commenting on the state of the Air Force's Dynasoar program at the beginning of the Kennedy administration. Cited by Eugene Zuckert, oral history interview of, July 25, 1964, 168.7050-1, AFHRA, 48.

⁵ AFSC, *Commander's Congressional Policy Book*, volume II, Tab C-1, Dynasoar Program (X-20), 168.7171-52, AFHRA, 1. Declassified at author's request.

scribe the genesis of NASA's Project Gemini, then a McNamara attempt to wrest management control of Gemini from NASA for the DoD, and the resulting role of DoD in the project that emerged early in 1963. After Webb and McNamara defined the DoD's role in Gemini in January 1963, Gemini began to influence McNamara's thinking about the requirement for Project Dynasoar; by the end of the year he canceled Dynasoar, believing that a combination of the Gemini capsule and a module attached to it could best fulfill DoD's human spaceflight requirements. The exact specifications of the MOL became clear in 1963, however, only after another significant period of NASA-DoD give-and-take to ensure that the MOL was not considered a space station, thereby infringing on a mission area in which NASA felt it should play the primary role.

Project Gemini and the DoD

Project Gemini is often lost in the shuffle between America's first human steps into space with Mercury and its successful drive to the moon with Apollo. Besides serving as a vital developmental bridge between Mercury and Apollo, Gemini is also of crucial importance within the NASA-DoD human spaceflight framework. The capabilities it offered eventually convinced McNamara to cancel Dynasoar and initiate a new DoD human spaceflight project based on the Gemini capsule, with a cylindrical laboratory attached to it, called Manned Orbiting Laboratory.

Overview of Gemini and the DoD's Role

On April 14, 1961 NASA offered a study contract to the McDonnell Corporation for an improved version of the Mercury spacecraft. This Mercury Mark II would increase the size of the original Mercury capsule by approximately fifty percent so it could carry two astronauts instead of one. In addition, significant hardware modifications to the capsule would enable it to conduct advanced missions such as rendezvous, docking, and transfer of humans and material, as well as extravehicular activity (EVA) or "space walking." In addition in May 1961 the Martin Company, the manufacturer of the Air Force's Titan missile, briefed NASA on the ICBM's possible applications to the next level of NASA's human spaceflight program. On December 7, 1961 NASA officially approved a development plan for the Mercury Mark II

program involving the larger and more capable capsule and the Titan rocket. On January 2, 1962 the program was given its official name: Project Gemini.⁶

From Gemini's earliest moments there was disagreement over the exact role DoD should play. NASA Deputy Associate Administrator for Defense Affairs W. Fred Boone said that from its inception Gemini was "visualized as a program in which the Air Force would be deeply involved."⁷ During the LLVPG deliberations Golovin recorded that OMSF Director D. Brainerd Holmes "... proposed having Air Force officers associated in all activities at STG [Space Task Group, NASA's organization at its Langley Research Center responsible for Mercury, and the early stages of Gemini, before the Manned Spacecraft Center in Houston was created], but no organizational responsibilities." However, the LLVPG's deputy director, Lawrence Kavanau of the Office of the DDR&E "... argued very strongly for direct Air Force participation at the STG level, suggesting that this participation should be at the Holmes level. Holmes opposed this concept strongly."⁸ The December 7, 1961 memo explaining Gemini was actually written by both Seamans and Rubel and addressed to both Webb and McNamara. It explained that as a result of "... extensive studies, it is believed that the development of an earth orbital rendezvous capability is most important for the timely accomplishment of the manned space flight and manned lunar missions." Therefore Mercury Mark II (soon to be renamed Gemini) had been formulated "with the objective of achieving manned rendezvous and relatively long duration earth orbital flight on a schedule considerably earlier than possible for the Apollo spacecraft." Seamans and Rubel continued, "The overall management and direction for the Mercury Mark II/Agenda rendezvous development and experiments is the responsibility of the NASA as part of the manned space flight program. However, it is recognized that it is highly desirable that the resources of the DOD, especially the Air Force, be utilized in a contractor re-

⁶ The complete history of Project Gemini is Barton C. Hacker and James M. Grimwood, *On the Shoulders of Titans: A History of Project Gemini*, NASA SP-4203 (Washington, DC: USGPO, 1977). For a synopsis, see Linda Neumann Ezell, *NASA Historical Data Book Volume II: Programs and Projects 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 149-70.

⁷ W. Fred Boone, *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32 (Washington, DC: USGPO, 1970), 83.

⁸ Nicholas Golovin, Chronological File entry, December 1-5, 1961, folder: Chronological file, October-December 1961, box 6, Nicholas Golovin papers, LoC, 1.

lationship by the NASA to the maximum degree practicable, both in order to facilitate the attainment of project objectives and to permit DOD organizations to acquire useful design, development and operational experience."⁹

Seamans and Rubel concluded by outlining the initial Air Force role in Gemini, which "... should include that of being the NASA contractor for the Titan II launch vehicle of the Mercury Mark II spacecraft and for the Atlas-Agena vehicle used in rendezvous experiments. DOD responsibilities should also include assistance in the provision and selection of astronauts and the provision of launch, range and recovery support, as required by NASA."¹⁰ The government's official description of Gemini said its goals were to, "... develop and fly at an early date, a two-man spacecraft capable of rendezvous and being brought together (docking) with another vehicle in orbit around the earth, and carry out orbital flights lasting from a few days to a week to study how man functions under prolonged conditions of weightlessness to carry out a variety of scientific investigations of space. . . ."¹¹ Internally, in the context of McNamara's attempt in late 1962/early 1963 to take over Gemini, NASA emphasized that Gemini was a critical link and essential step between Mercury and Apollo: "The experience to be gained in Gemini, both in hardware and in operations, is needed in order to proceed with the current Apollo program." If Apollo had to proceed without the benefit of Gemini, "This alone would cause a substantial delay in the achievement of a manned lunar landing, and would increase the Apollo program costs."¹² Nevertheless, the DoD's interest in Gemini continued because it offered two potentially valuable defense-related capa-

⁹ Deputy DDR&E John Rubel and NASA Associate Administrator Robert Seamans, Memorandum to McNamara and Webb, Recommendation relative to the division of effort between the NASA and the DOD in the development of space rendezvous and capabilities, December 7, 1961, folder: DOD/USAF "Blue Gemini," DoD subseries, Federal Agencies series, NHDRC, 1. The Air Force Agena vehicle would be launched on an Air Force Atlas rocket and serve as the target vehicle for the Gemini capsule's (launched on an Air Force Titan) rendezvous exercises.

¹⁰ Ibid., 2.

¹¹ Executive Office of the President, *U.S. Aeronautics and Space Activities, 1961*, Message to the Congress from the President of the United States, January 31, 1962, NSA MUS document 326, p. 9. Actually, the longest Gemini mission turned out to be Gemini 7 in December 1965, which orbited the earth for over 13 days.

¹² NASA, internal position paper on Project Gemini, marked "Confidential," January 7, 1963, folder: Webb, declassified papers, 1961-1968, Webb subseries, Administrators series, NHDRC, 7.

bilities. First, its enlarged capsule offered a possible platform from which to gather reconnaissance information in which humans could screen and exercise some kind of discrimination over incoming data. Second, if the rendezvous and docking of spacecraft could be successfully mastered, Gemini could serve as a system with which to conduct manned inspection of possibly hostile satellites, and potentially even the neutralization or destruction of such satellites.

In addition to the Seamans-Rubel memo of December 1961, these men signed an agreement the next month delineating exactly what NASA and what the DoD would do in Gemini. NASA would be responsible for: overall program management, planning, direction, system engineering and operation; development of the Gemini spacecraft and development of the interface, rendezvous, and docking equipment for the Gemini-Agena combination; Titan II-Gemini systems integration; overall mission responsibility for launch, flight, and recovery operation; overall command, tracking and telemetry during orbital operations; and providing reciprocal support for any DoD space projects and programs within the scope of the Gemini project. The DoD would be charged with: developing and procuring the modified Titan II required to launch the Gemini capsule; procuring the Agena target vehicles as well as the Atlas boosters required to launch them; performing Atlas-Agena system integration; launching the Titan II and Atlas-Agena vehicles; and range support and recovery.¹³ Over the remainder of 1962, however, McNamara concluded the DoD's role should be greater. By the end of the year he took action.

The Air Force and Space Stations, 1962

The necessary background for McNamara's assertion in November 1962 that the DoD should take over Gemini management (see below) was Air Force efforts throughout 1962 to achieve OSD permission to begin a space station project. While McNamara rebuffed these efforts, it seems likely that the Air Force made enough of a case concerning the requirement for earth orbital operations to convince

¹³ Agreement between NASA and the DoD on the Gemini Program, signed by Rubel and Seamans, January 29, 1962, included as an attachment to a memorandum from George M. Low, Director, Spacecraft and Flight Missions, Office of Manned Space Flight, NASA, to Director of the Manned Spacecraft Center, NASA-DoD Operational and Management Plan for Gemini, February 7, 1962, SPI document 450, pp. 1-2.

McNamara that the DoD should at least have greater control of Gemini so as to assure Gemini met DoD requirements for the "building blocks" of developing earth orbital techniques and equipment.

The reader will recall from chapter 5 that the Air Force had conducted low-level studies of space station feasibility throughout the Eisenhower and into the early Kennedy administrations under the rubric Military Test Space Station. These efforts intensified in 1962 and moved toward specific designs of a program called Military Orbital Development System, or MODS. Behind all these efforts (and behind the future MOL) lurked the reconnaissance requirement. As a DDR&E report to McNamara explained in February 1962, "In the near future it may become necessary to conduct optical surveillance from high altitude orbits. Very large optics will be required if good resolution is desired. Use of such optics may be quite feasible. . . . However, the practicability of such a system would almost certainly depend on the use of man for system adjustment and continued operation of equipment."¹⁴ The second possible use OSD seemed to allow was the use of an orbital platform for the inspection and possible neutralization of hostile satellites. Lieutenant General James Ferguson, Deputy CSAF for Development, represented the Air Force space community's viewpoint when he declared on February 12, 1962, "We are convinced that a manned, military test space station should be undertaken as early as possible."¹⁵

Therefore, in the midst of the OSD skepticism described in chapter 7, a small, experimental, DoD manned orbital platform seemed to be the one tiny ray of hope the Air Force sensed in McNamara's otherwise negative attitude toward military space. McNamara's explanation to Zuckert in February 1962 of his position on the DoD's human spaceflight program opened with the standard caveat, "In the absence of a clearly defined military manned space mission, present military efforts should be directed to the establishment of the necessary technological base and experience upon which to expand, with the shortest possible time lag, in the event firm military manned space missions and requirements are established in the future." McNamara also added the standard stipulation that Air Force space efforts must be meshed

¹⁴ Office of the DDR&E, Report to McNamara, Manned Military Space Programs, Tab A, February 20, 1962, folder: Reading File, January-May 1962, box 114, RG 200, Robert McNamara papers, NARA, 2. Declassified at author's request.

¹⁵ Carl Berger, *The Air Force in Space: Fiscal Year 1962* (Washington, DC: USAF HDLO, June 1966), 39.

with NASA's: "Space technologies primarily related to military applications must be advanced concurrently with those being exploited primarily for scientific applications." of which one example was the "establishment of comprehensive plans for cooperative DOD-NASA programs covering manned rendezvous." But then McNamara also allowed "It may be necessary that the Air Force conduct a complementary experimental program of manned rendezvous directed at Defense requirements for docking and transfer involving uncooperative targets." Mostly, however, McNamara emphasized working with NASA and its Gemini program, suggesting that the Air Force study the feasibility of combining and adopting Gemini hardware with any emerging Air Force space platform. In addition, he closed his instructions to Zuckert by writing:

It is recognized that a space laboratory to conduct sustained tests of military man and equipment under actual environmental conditions impossible to duplicate fully on earth would be most useful. . . . Ultimate realization of the full potential of such a facility, however, is dependent on the attainment of other capabilities (e.g., space rendezvous, docking and transfer) yet to be developed. For that reason, work in this area should be in the nature of a study to identify basic 'building blocks' which might be needed were such a facility to prove economically and technically feasible and warranted. The possible adaptation of GEMINI and DYNA SOAR technology and hardware to meet initial military experimental requirements for preliminary experimentation with a manned orbital test station is also worthy of study.¹⁶

Although this was by no means a ringing endorsement of a large, independent, highly capable Air Force space station, the Air Force saw it as at least a display by McNamara that he was willing to consider some type of presence for military officers in space. The Air Staff took this as official guidance and undertook an intensive planning effort.¹⁷ AFSC's Space Systems Division drew up new plans and perfected old ones that described basically two different programs. A "Blue Gemini"¹⁸ would allow Air Force pilots to fly on six Gemini missions so that the Air Force could gain experience, train astronauts, and generally become oriented for the later MODS missions. Some time later Assistant Secretary of the

¹⁶ McNamara, Memorandum for the Secretary of the Air Force, The Air Force Manned Military Space Program, February 22, 1962, folder: Reading File, January-May 1962, box 114, RG 200, Robert McNamara papers, NARA, 2. Declassified at author's request.

¹⁷ Berger, *Air Force in Space*, FY62, 36.

¹⁸ "Blue" in this context refers mainly to the color of the uniforms worn by USAF personnel. "Blue Gemini" would thus refer to a program whereby the Air Force would somehow own and operate its own Gemini capsules separate from NASA.

Air Force for Research and Development Alexander Flax described Blue Gemini as “. . . simply the idea that the Air Force would take over or follow on some of the NASA flights with Gemini with purely Air Force flights and Air Force experiments on these flights.” Seamans added Blue Gemini “. . . was really just a continuation of the present NASA Gemini, but under Air Force auspices. It did not as originally reviewed and studied include a laboratory module.”¹⁹ The best description of the still-classified Blue Gemini is, “Blue Gemini was neither clearly defined nor officially sanctioned.”²⁰ Blue Gemini appeared not to enter Air Force planning until August of 1962. MODS itself would be a military space station using Gemini as a ferry vehicle.²¹

The USAF completed its development plan for MODS on June 4, 1962. This large and detailed package included separate chapters describing the particulars of: Operations; Intelligence Estimates; Program Management; Scheduling; Acquisition; Civil Engineering; Logistics; Manpower and Organization; Personnel Training; Financial; Requirements; Authorizations; Security; and Program Summary. It described a four-person space station with “an optimum design which takes maximum advantage of GEMINI.” According to the Air Force: “MODS will provide a manned long-duration orbital base which will enable the conduct of military tests and experiments under laboratory conditions in the space environment. . . . It is a significant step toward a long-duration manned space capability. Once developed, this technology will provide an extremely flexible capability to meet future military requirements. In this

¹⁹ Congress, Senate, Committee on Aeronautical and Space Sciences, *Manned Orbiting Laboratory*, Hearings, 89th Congress, 2nd Session, February 24, 1966, p. 33-34.

²⁰ Hacker and Grimwood, *On the Shoulders of Titans*, 118.

²¹ This general Blue Gemini and MODS description is from Timothy Killebrew, Major, USAF, *Military Man in Space: A History of the Air Force Efforts to Find a Manned Space Mission*, Air Command and Staff College Report No. 87-1425 (Maxwell, AFB, AL: Air University, May 1987), 25. The official USAF development plan for Blue Gemini is, unfortunately, still classified at AFHRA and has been exempted from declassification IAW E.O. 12958. The term “Blue Gemini” thus becomes extremely confusing because in the uncertainty surrounding Air Force refusal to declassify its exact meaning. Various authors have speculated that it represented: the program described above whereby Air Force astronauts would fly on NASA Gemini flights; or a separate program of the Air Force acquiring Gemini capsules and independently launching them in an AF-only program; or the MODS program itself; or the program that would eventually emerge in January 1963 whereby the DoD was permitted to include DoD experiments on NASA Gemini flights. The author was, however, able to obtain portions of the MODS development plan and they are discussed below.

sense, MODS is not an end itself, but a means to an end." The system itself consisted of a permanently orbiting station module, an earth-based spacecraft comprised of a modified Gemini capsule for ferry purposes, and a new launch vehicle, probably the Titan III. The crew of four could remain in the 1,700 cubic foot station module for thirty days without resupply while the station itself would remain in orbit for at least a year. The USAF fully expected MODS to grow: "Ultimately, as MODS is expanded through modular extension, it will serve as a base from which experimental military space vehicles can be developed, tested and employed."²²

Secondary sources have determined that the Air Force believed MODS could begin operations by March 1967 and cost \$733 million.²³ In addition, MODS' primary missions have been listed as: general reconnaissance; request reconnaissance of given areas or targets; post-strike reconnaissance; continuous surveillance of an area; and ocean surveillance.²⁴ One problem with the USAF's MODS plan was that NASA desired a very similar station. One source said MODS was "... in well-known competition with the NASA MOSS (Manned Orbiting Space Station) which the agency has tentatively scheduled for about 1966."²⁵ NASA's Langley Research Center had drawn up detailed plans for a Manned Orbital Research Laboratory (MORL) very similar to MODS in that it was also a medium-sized, zero-gravity station using much the same hardware and many of the same contractors as the Air Force proposed for MODS.²⁶ The MORL was significant because for the first time NASA was permitted to let contracts for study and design of a space station, whereas before such work had been done by NASA in-house.²⁷ NASA's Long Range

²² AFSC, Headquarters, Partial Systems Package Plan for Military Orbital Development System (MODS) System Number 648C, June 4, 1962, K243.8636-9, AFHRA, iii, 1-1 through 1-2, 12-1. Declassified at author's request.

²³ Roy F. Houchin II, Major, USAF, *The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1945-1963* (Ph.D. dissertation, Auburn University, 1994), 226.

²⁴ Adam Gruen, *The Port Unknown* (Ph.D. dissertation, Duke University, 1989), 171.

²⁵ "Air Force Space Plan," *Space Daily*, October 18, 1962, p. 474.

²⁶ Roy Houchin II, "Interagency Rivalry?" *Quest: The History of Spaceflight Magazine* 4 (Winter 1995): 37. For the full story of the MORL see James R. Hansen, *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo*, NASA SP-4308 (Washington, DC: USGPO, 1995), 274-293.

²⁷ Gruen, 157.

Plan of January 1962 said NASA could launch a manned earth orbiting laboratory as early as 1964 and by 1966 could launch much larger and more capable ones based on Apollo spacecraft and hardware and Saturn launch vehicles.²⁸

BoB, ever watchful for wasteful spending, pointed out the crux of the problem for NASA and the Air Force when it described the national space station effort: "The presence of this type of project in both the NASA (Manned Space Station) and Defense (Military Orbital Development System) projections raises the question of the need for two development programs to furnish a basic facility and capability which could support many types of technical activity."²⁹ Summarized one analyst, "In the relatively exotic category of space stations, it did not seem likely that both the Department of Defense and NASA would each get to develop one. . . . NASA and Air Force concepts for a space station were roughly equivalent. . . . One NASA engineer would later wonder if contractors had given the same study information to both NASA and the Air Force, but with differently colored covers."³⁰

Nevertheless, the Air Force persevered with its Blue Gemini/MODS plans and on November 9, 1962 Zuckert wrote McNamara with an official request for a \$420 million increase in the Air Force space program for FY64, of which \$75 million was for MODS and \$102 million for Blue Gemini.³¹ As one Air Force history said, by late 1962 "The Air Force attached great importance to the MODS."³² However, given the fact that the entire DoD space budget was \$1.55 billion in FY63, a \$420 million increase

²⁸ NASA, Long Range Plan, January 1962, folder: NASA Long Range Plan, box 1, National Aeronautics and Space Administration: Documents relating to the space program, 1953-1962, DDEL, 95.

²⁹ Bureau of the Budget, Military Division, Draft Staff Report, Special Space Review, August 1962, folder: DOD and NASA Space Programs 1962, box 20, RG 200, Robert S. McNamara papers, NARA, V-1.

³⁰ Gruen, 167. Gruen's emphasis.

³¹ The balance of the \$420 million was \$193 million for Midas, the system designed to provide early warning of ballistic missile attack, and \$50 million for the unmanned Saint or Satellite Interceptor program. See Launor F. Carter, Chief Scientist of the Air Force, "An Interpretive Study of the Formulation of the Air Force Space Program," February 4, 1963, SPI unnumbered document, 9; and Gerald Cantwell, *The Air Force in Space, Fiscal Year 1963* (Washington, DC: USAF HDLO, December 1966), 8. Declassified at author's request.

³² Cantwell, *Air Force in Space, FY63*, 26. Declassified at author's request.

probably had limited, if any appeal, to the OSD.³³ McNamara stated he would favor MODS only “. . . if it adds anything substantial to what we are already doing in X-20 and the NASA Gemini and other programs.”³⁴

McNamara Responded

McNamara's response to the Air Force Blue Gemini and MODS proposals was to reject them but to attempt to obtain a greater role for the DoD in NASA's Gemini program. Blue Gemini/MODS “. . . never progressed beyond the proposal stage, partly because there was no unified position on it but also because other developments soon overshadowed it.”³⁵ In January 1963 McNamara refused to include either Blue Gemini or MODS in the DoD's FY64 budget request to Congress, apparently concluding the Air Force requests were duplicating Gemini.³⁶ A government report said concerning MODS and Blue Gemini, that under “. . . prevailing policies of restraint in space work, cost effectiveness, and precise program and requirements definition, the specific proposals did not survive.”³⁷ Flax stated that Blue Gemini and MODS “. . . never received very serious consideration at the higher echelons of the Air Force and the

³³ NASA, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities* (Washington, DC: USGPO, 1996), A-30.

³⁴ McNamara, interviewed in *Missiles and Rockets*, October 22, 1962, and extracted in, USAF, Office of the Secretary of the Air Force, *The Military Mission in Space: A Selection of Published Views, August 1961-June 1963*, June 7, 1963, folder: Military Mission in Space, DoD subseries, Federal Agencies series, NHDRC, no page numbers given.

³⁵ Cantwell, *Air Force in Space, FY63*, 30. One should note that there was also dissension within the Air Force concerning how far the Air Force could and should push cutting-edge space proposals like Blue Gemini and MODS without endangering the already-existing Dynasoar effort: “If Gemini were stretched beyond 1966 in any modified capsule version . . . then Gemini clearly would become competitive with Dyna-Soar.” See Cantwell, *Air Force in Space, FY63*, 30.

³⁶ See Houchin, *Rise and Fall of Dyna-Soar*, 238; Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, volume II* (Maxwell AFB, AL: Air University Press, 1989), 143; and Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 83.

³⁷ *Government Operations in Space*, 81.

Department of Defense at that time."³⁸ The Air Force space proposals did, however, collectively "interest McNamara in exploring the possibility of a joint project with NASA."³⁹

The November-December sequence of events in which McNamara proposed that DoD should assume management of the Gemini program survives only in oral history recollections because apparently McNamara did not make a written offer, just a verbal proposal. The documents that do survive are NASA's pointed rebuttals to McNamara's position. Seamans recalled that he and Webb concluded by November 1962 that the DoD should be able to make greater use of the Gemini hardware NASA was developing: "If they didn't have their own program, at least shouldn't they have the opportunity to put experiments in our program and to run tests that would be useful to them?" So he and Webb went to discuss their idea with Gilpatric, at which point McNamara happened to enter the room. McNamara said, "This is a really good idea. It's exactly what we would like to do - get the most we can out of these programs." But Seamans then said,

All of a sudden it seemed as though the thing [Gemini] was going to be grabbed hold of and almost taken away. You know, this came up several times, incidentally, that - wouldn't it be a good thing, not to have sort of two programs, but wouldn't it be a good idea to transfer the Gemini program over to the DOD? And McNamara made quite a strong case for this. Jerry Wiesner [Kennedy's science adviser and head of the Office of Science and Technology in the White House] made a strong case for this. McNamara and Gilpatric and Rubel said they were making the strongest case they could for this transfer, and we were making the strongest case we could for not transferring it. We were into the program. We had people trained. We said, 'What are you going to do? Take over in Houston? How will you manage it?'

It had some of these elements, again, of a sort of overcontrol by the Defense Department of our business. At least, we looked at it that way. But it finally shook down to a group that would review the experiments that were going to be carried out [on board Gemini], and some money was put in the DOD budget for experiments.⁴⁰

Gemini's official history, based on interviews and correspondence with Seamans, contains a similar version, explaining that when Webb and Seamans made their offer to McNamara for a larger DoD role in the Gemini program, "His response to their offer was more than the two NASA spokesmen had

³⁸ *Manned Orbiting Laboratory*, 33.

³⁹ Cantwell, *Air Force in Space*, FY63, 26.

⁴⁰ Oral history interview of Seamans, May 26, 1966, folder: Gemini Interview, Seamans subseries, Deputy Administrators series, NHDRC, 14.

bargained for; it took the Air Force by surprise as well. McNamara not only welcomed the idea of cooperation - he proposed merging the NASA Gemini program with the Air Force project and moving the combined effort to the Department of Defense."⁴¹ Webb's recollection was simply, "Wiesner and McNamara were working very closely together, they were having lunch once a week. . . . they began to sort of mount a game, an effort to prevent us from moving independently."⁴² Arnold S. Levine interviewed anonymous NASA insiders for his book: "According to one source, McNamara proposed that DOD take over all manned flight in Earth orbit; NASA all flights beyond Earth orbit. . . . NASA officials sensed that they could not accede to such a proposal and still retain control over their programs."⁴³ Webb's biographer stated, "Webb saw the stakes as nothing short of NASA's independence as an agency." Webb reported explained that the Gemini incident was typical of McNamara's way of doing business, which was to ". . . knock you down on the floor with a sledge-hammer, and then, while you're down, ask you to sign off on a particular decision."⁴⁴

Documentary evidence does verify the NASA officials' accounts of the role of Jerome Wiesner and his Office of Science and Technology (OST) in the White House. One Kennedy administration insider explained Wiesner's close relationship to Kennedy, "President Kennedy turned to the Science Adviser, Dr. Wiesner, on many occasions on issues ranging from desalination of sea and brackish water to a whole series of defense issues related to research and development. What was new in this picture was the close personal relationship the President had with Dr. Wiesner. . . . The President saw a great deal of the Science Adviser. . . . The President had a very high regard for him and there was a very personal relation-

⁴¹ Hacker and Grimwood, *Shoulders of Titans*, 34.

⁴² Oral history interview of Webb, April 11, 1974, James Webb file, Biographical series, NHDRC, 34.

⁴³ Arnold S. Levine, *Managing NASA in the Apollo Era*, NASA SP-4102 (Washington, DC: USGPO, 1982), 230.

⁴⁴ W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 119. Webb's characterization of McNamara's negotiating style is from a Lambright interview with Webb on January 8, 1991.

ship between them.”⁴⁵ Certainly Kennedy never took all the advice from a particular confidant. In fact, Wiesner was not keen on the overall lunar landing program nor on the specific NASA decision to pursue the LOR mission mode over the EOR method. Nevertheless, OST’s and Wiesner’s strong backing of a DoD takeover of Gemini shows the legitimate nature of the threat NASA faced.

Golovin, by late 1962 working for OST after departing NASA on less than amicable terms, wrote Wiesner in December that since “the NASA program has been expanding at an extremely rapid rate,” NASA’s resources “will obviously be strained to an increasing degree in Apollo technical management.” The administration had to decide “. . . whether greater success in the national space program would be achieved by shifting part or all of the responsibility for Gemini from NASA to the DoD.” Golovin supported such a transfer, citing its “direct management benefits,” the fact that it would “enable more effective and rapid development of the military space program,” and its “obvious domestic political advantages.” DoD was the logical choice because, “DOD resources and capabilities for technical space program management have been, and are likely to continue to be, substantially less strained.” NASA could still use space station equipment the DoD developed because, “It is difficult to see any differences in the requirements for an engineering space laboratory between DOD and NASA - substantially the same technological problems involved in developing equipment suitable for extended operations in space will be met by both agencies.” Therefore, “. . . only one Manned Space Station Program should be undertaken for meeting all national space needs. This program should be assigned for implementation to the DOD.”⁴⁶

Wiesner took Golovin’s inputs, endorsed them, and incorporated them into a memo for Kennedy. Wiesner stated that earth orbit activities will become “. . . an increasingly important and costly part of both the military and scientific space efforts, therefore we should make a major effort to unify them now before we become committed to two large programs.” Wiesner recommended, “Arrangements be initiated for a major investment of the DOD, including funding, in the Gemini program and that the DynaSoar

⁴⁵ Elmer Staats, Oral history interview of, July 13, 1964, folder: Kennedy Library, box: White House, Presidents, Kennedy, Photographs - Presidential Library, NHDRC, 32-33.

⁴⁶ Nicholas E. Golovin, Memorandum to Jerome Wiesner, Suggestions Concerning the National Space Program, December 21, 1962, folder: Withdrawn items, box 166, RG 359, Records of the Office of Science and Technology, NARA, 6-9. Declassified at author’s request.

effort be collaterally reprogrammed to a small fraction of its current level. . . . It would seem advisable that the DOD be assigned responsibility for this development" of the Gemini and any follow-on space station.⁴⁷

NASA Held Fast

McDougall stated, "Webb exploded at this open assault on NASA. . . ."⁴⁸ NASA wasted no time in marshaling its forces. W. Fred Boone, NASA's Deputy Associate Administrator for Defense Affairs and a retired admiral, would spearhead NASA's response.⁴⁹ NASA stated the primary reason it opposed transferring Gemini to the DoD was, "It is estimated that the Gemini schedule would slip at least one year, with a concurrent major increase in program cost." This would in turn delay the lunar landing program by at least the same amount of time. NASA granted that further ". . . national benefits could be derived through greater Air Force participation in NASA's Gemini program" but that a wholesale DoD management takeover was not required.⁵⁰

Other internal NASA documents reveal additional concerns buttressed NASA's opposition to a DoD Gemini transfer. For instance, many of the agreements NASA had forged with other countries to place NASA tracking stations on their territory were predicated on the notion that the facilities not be used for military purposes. Should DoD manage Gemini, NASA was likely to lose access to its stations

⁴⁷ Jerome Wiesner, Memorandum for the President, Need for DOD-NASA Coordination and Consolidation in Earth-Orbit Space Activities, January 10, 1963, in Paul L. Kesaris and Robert Lester, Project Coordinators, *President John F. Kennedy's Office Files, 1961-1963, Part 1: Special Correspondence, Speeches, Legislative, and Press Conference Files*, in *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenberg, General Editor (Frederick, MD: University Publications of America, Inc., 1989), reel 9, pp. 1, 4.

⁴⁸ Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., 1985), 340.

⁴⁹ In his memoirs, Boone confirmed Webb's and Seaman's account of the origins of the controversy: "McNamara, in jointing a meeting late in 1962 at which Webb was present, had orally proposed that the NASA and the Air Force manned space flight programs be combined and the entire package placed under DOD management." Boone, *NASA Office of Defense Affairs*, 9.

⁵⁰ NASA, internal position paper on Project Gemini, marked "Confidential," January 7, 1963, folder: Webb, declassified papers, 1961-1968, Webb subseries, Administrators series, NHDRC, 21, 28.

in, at a minimum, Mexico, Nigeria, Zanzibar, and Spain.⁵¹ Boone's summary memorandum stated, "The Gemini program should continue under the direction of NASA, with increased DOD (USAF) participation, on a not-to-delay basis, in order to further DOD objectives in space." However, management of the program had to remain in NASA because, "Dislocation and loss of continuity in the developmental effort, which would inevitably accompany a transfer of management, would result in a substantial delay and increased cost in the Apollo lunar landing program. The Apollo program, as currently planned, could not be accomplished without the experience to be gained from Gemini. . . . Any delay would reduce the chances that the United States will make a manned lunar landing before the Russians do."⁵²

McNamara's first response to NASA's adamant refusal to consider transferring Gemini to the DoD was to propose joint management of the program. On January 12, 1963 he sent a pre-signed agreement to Webb (a common McNamara tactic) that proposed an eight-person Gemini Program Steering Board consisting of four representatives from each institution. It would control and manage the Gemini program so as to ensure it was ". . . planned, executed, and utilized in the overall national interest so as to avoid duplication of effort . . . and to insure maximum attainment of objectives of value to both the NASA and the Defense Department."⁵³ Webb responded, "I cannot agree that your proposed version of an agreement would set up management arrangements suitable to a national Gemini program. Nor do I consider its basic pattern one which can be made acceptable through a series of negotiated changes. . . . To join the DOD and NASA programs in a monolithic effort would inevitably cause the total program to be characterized as military with substantial loss of flexibility in our national posture." Webb proposed that the DoD submit experiments to NASA for inclusion on the Gemini manifest and that the DoD ". . . participate in the development, pilot training, pre-flight check-out, launch operations and flight operations of

⁵¹ Edmond C. Buckley, Director of NASA Tracking and Data Acquisition, Memorandum to Boone, Ramifications of DOD Absorption of the GEMINI Program, January 8, 1963, folder: DOD/USAF "Blue Gemini," DoD subseries, Federal Agencies series, NHDRC.

⁵² Boone, Memorandum to Webb, Project Gemini, January 9, 1963, folder: Webb, declassified papers, 1961-1968, Webb subseries, Administrators series, NHDRC, 1-3.

⁵³ McNamara, proposed Agreement between the Department of Defense and the National Aeronautics and Space Administration, Gemini Program Management, January 12, 1963, SPI document 888, p. 1.

the Gemini Program to the extent necessary to meet the DOD objectives.” However, those concessions to increased DoD participation were “about as far as we in NASA feel we can go at this time.”⁵⁴ Privately, Webb wrote Seamans, “I do not see how we can discharge our responsibilities and give him a veto. . . . We must not recede from this position except as we reach a settlement that all of us can live with.”⁵⁵

Three days later Webb and McNamara did arrive at a settlement. It appears McNamara was not willing to push the situation any further, because the January 21, 1963 NASA-DoD Gemini agreement incorporated primarily NASA’s viewpoint on Gemini management, not OSD’s. NASA would permit the DoD to include experiments on the Gemini flights but the DoD would not assume an active role in managing the program. The experimental program, as well as the DoD support role in Gemini, would be implemented and supervised by a new five-person body called the Gemini Program and Planning Board (GPPB). The GPPB would report directly to Webb and McNamara, be chaired by the NASA Associate Administrator and the Assistant Secretary of the Air Force for R&D, and have two additional members from NASA and the DoD. The agreement made clear, “NASA will continue to manage the GEMINI project. It is, however, agreed that the DOD will participate in the development, pilot training, preflight check-out, launch operations and flight operations of the GEMINI Program to assist NASA and to meet the DOD objectives.” DoD would contribute funds in accordance with the GPPB’s determination. Probably the most important clause of the NASA-DoD Gemini agreement stated, “It is further agreed that the DOD and the NASA will initiate major new programs or projects in the field of manned space flight aimed chiefly at the attainment of experimental or other capabilities in near-earth orbit only by mutual agreement.”⁵⁶

⁵⁴ Webb, Letter to McNamara, January 16, 1963, in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 338-39.

⁵⁵ Webb, Letter to Seamans, January 18, 1963, in *ibid.*, 339-41.

⁵⁶ Webb and McNamara, Agreement Between the National Aeronautics and Space Administration and the Department of Defense Concerning the Gemini Program, January 21, 1963, in *ibid.*, 341-42.

The GPPB and the DoD

The GPPB was strictly advisory in nature and met fourteen times between its inception and its final meeting on April 12, 1965. Its duties basically entailed: overseeing the planning and conduct of Gemini experiments to including establishing priorities; processing and disseminating the results from these experiments; and establishing the criteria for and then monitoring the process whereby the USAF Titan II was man-rated, i.e., made reliable enough to be used as a space booster that could carry humans. All in all, "The arrangements worked out very satisfactorily."⁵⁷ The specific list of DoD experiments to be incorporated into the Gemini program was not finalized until 1964 and so will be discussed in chapter 10; they were closely linked to the missions of reconnaissance and satellite inspection. However, there were some indications in the last year of Kennedy's presidency that the relatively limited nature of DoD's participation in the Gemini program, and its lack of any managerial input, was perceived as being an inadequate forum in which to conduct the necessary investigation into the usefulness of military officers in space. Therefore, the approval of a wholly DoD human spaceflight program, the MOL, increased in likelihood over the course of 1963.

Lawrence Kavanau, the special assistant for space in the Office of the DDR&E, said in May 1963, "We are finding that, although there are many important and worthwhile things that can be done with GEMINI, due to the late stage of development, no significant DOD input can be made to the GEMINI design. GEMINI, while highly useful, could have been made even more so by joint participation earlier in the game."⁵⁸ DDR&E Brown amplified this sentiment the next month: "There is a disadvantage to entering a program that someone else is running which has been going on for some time. On the other hand, Defense does not stay a junior partner indefinitely in anything that it gets into."⁵⁹ As will be seen below, by June 1963, Brown was already seriously investigating the DoD's requirements for its own separate orbital platform, a concept that in six months would be approved as MOL.

⁵⁷ Boone, *NASA Office of Defense Affairs*, 84, 87.

⁵⁸ Cited in "DOD Asks Space Station Role," *Space Daily*, May 22, 1963, p. 651.

⁵⁹ Cited in "The Dyna Soar Paradox," *Space Daily*, June 26, 1963, p. 827.

Dynasoar in 1961-62

The necessary preliminary to examining the MOL's emergence is understanding the progress of Dynasoar in the Kennedy administration and the close link that existed in OSD's thinking between Dynasoar and NASA's Gemini. The only time during the Kennedy administration in which the Dynasoar's future looked bright was in the first few months when Kennedy was dramatically increasing virtually all categories of defense spending (see Chapter 6.) As part of this upswing Dynasoar's FY62 budget was increased from the final Eisenhower figure of \$76.5 million to \$106.5 million. In April McNamara told the Senate. "This project is, of course, only a first step toward the development of a militarily useful vehicle and at the present time is conceived of strictly as a research effort. The additional \$30 million requested would permit the work on this project to go forward at a more efficient rate."⁶⁰ Not only did Congress grant this increase, but the House Appropriations Committee added another \$85.8 million to the DoD request, an amount that McNamara declared he had no intention of committing to Dynasoar: "I doubt very much that we can expend that effectively and efficiently."⁶¹ Therefore there were limits to the OSD's early support of Dynasoar. During this early period the Air Force still planned for a three-step Dynasoar development program. In Step I preliminary suborbital R&D would be conducted. In Step II a larger booster would lift manned and unmanned gliders to global range and orbital flight for tests of military equipment. In the final step actual weapons systems would be studied and operational systems devel-

⁶⁰ McNamara. Statement before the Senate Armed Services Committee, April 4, 1961, folder: Statements to Congressional Committees, FY62, box 11, RG 200, Robert S. McNamara papers, NARA, 26.

⁶¹ McNamara. Press Conference, June 23, 1961, folder: News Conferences and Press Briefings, 1961, box 182, RG 200, Robert McNamara papers, NARA, 5. See also: John B. Hungerford Jr., Major, USAF, *Organization for Military Space - A Historical Perspective*, Air Command and Staff College Report Number 92-1235 (Maxwell AFB, AL: Air University, 1982), 45; and Berger, *Air Force in Space*, FY63, 29.

oped.⁶² The OSD, however, had only approved step I.⁶³ The first of six piloted flights was scheduled for May 1966 and program cost before completion in December 1967 was estimated at \$921 million.⁶⁴

Dual Reorientation

In late 1961 and early 1962 McNamara and the OSD reoriented Dynasoar in two senses. First, the suborbital phase of Dynasoar was dropped because McNamara had concluded the Titan III would have adequate capacity to boost the glider to orbital velocity without extensive testing in the suborbital realm. This elimination of the suborbital step in the Dynasoar program would, in turn, reduce overall R&D costs. Second, the OSD ordered the Air Force to drop all references to the potential and future military applications of the Dynasoar and to view it wholly as an orbital, not a suborbital, R&D project. This meant that the Dynasoar's research focus in turn shifted from exploring the intricacies of hypersonic flight, a topic in which NASA had great interest, to investigating the challenges of controlled and maneuverable atmospheric reentry and landing at a selected Air Force base, a topic in which NASA had little interest.

McNamara asked Congress in January 1962 for a \$115 million FY63 Dynasoar budget, despite Congress' desire to allocate \$185 million. He said his figure was all the OSD believed was required and could be effectively utilized: "As you may know, last month we reoriented the entire program, eliminating the suborbital flight phase which would have involved the use of a modified Titan II booster. This intermediate step is no longer necessary inasmuch as we are now proposing very substantial investments in the Titan III booster program."⁶⁵ NASA noted that same month, "The Dynasoar was originally planned as a pilot controlled hypersonic Mach 16 glider. The project has recently been changed to the

⁶² Internal Air Force document, Advanced Systems: DYNASOAR, March 13, 1961, contained in *Briefing Book for Air Force witnesses before the House Committee on Science and Astronautics on the Subject of DOD Space Directive 5160.32, K160.8636-4, AFHSO, 1961, p.1.*

⁶³ Berger, *The Air Force in Space, FY62*, 26.

⁶⁴ As of October 1961, according to Houchin, *Rise and Fall of Dyna-Soar*, 202.

⁶⁵ McNamara, Statement before the Senate Armed Services Committee, January 19, 1962, folder: Miscellaneous Budget, box 114, RG 200, Robert S. McNamara papers, NARA, 97. Declassified at author's request.

development of a pilot controlled earth orbital spacecraft suitable for winged reentry through the earth's atmosphere to an aerodynamically controlled earth landing."⁶⁶

Simultaneously, the Air Force was instructed to play down the military applications of the space glider and emphasize that it was supposed to be only a hypersonic R&D or test vehicle. McNamara wrote Kennedy he believed it proper to "... reorient the program to solve the difficult technical problem involved in boosting a body of high-lift into orbit, sustaining man in it and recovering the vehicle at a designated place rather than to press on with a full system development program" of military applications.⁶⁷ The edict went out: the USAF was no longer to actively explore, nor discuss, the potential military applications of the Dynasoar system such as reconnaissance. The Office of the DDR&E suggested McNamara even give Dynasoar a new name in the tradition of the X-series of aircraft that represented purely research projects with no connotation of military operations or mission preparation whatsoever. Such a step would make the Dynasoar "more properly identifiable as an experimental development program (non-mission-oriented) with an appropriate research vehicle designation e.g., 'X-10'" and possibly give it more programmatic stability because in the past, "The DYNA SOAR program has alternately been considered for elimination, for stretch-out, for considerable acceleration, and for transfer to NASA."⁶⁸

Accordingly, McNamara declared on February 22, 1962, "The principle of proceeding directly to orbital flight test is endorsed." He also ordered the program's name be redesignated to "an appropriate research designation (e.g., X-19) to indicate more specifically that this is an experimental program and to eliminate any further connotation of previous weapon system and military test system studies within the presently approved development effort. . . ."⁶⁹ After several months wrangling, the new numerical design-

⁶⁶ NASA, Long Range Plan, January 1962, *supra*, 87.

⁶⁷ McNamara, Memorandum to Kennedy, December 7, 1961, reprinted in Curtis Peebles, "The Origins of the U.S. Space Shuttle," *Spaceflight* 21 (November 1979): 438.

⁶⁸ John Rubel signing for Harold Brown, Memorandum for the Secretary of Defense, Air Force Manned Military Space Program, February 20, 1962, with attached DDR&E report, Report on Military Manned Space Program, same date, folder: Reading File, January-May 1962, box 114, RG 200, Robert McNamara papers, NARA, p. 1 on both. Declassified at author's request.

⁶⁹ McNamara, Memorandum for the Secretary of the Air Force, The Air Force Manned Military Space Program, February 22, 1962, *supra*, 2-3.

nation for the Dynasoar program was announced on June 26, 1962 as "X-20."⁷⁰ The Air Force dutifully amended its Dynasoar development plan by deleting all references not only to suborbital flights but to the development of military subsystems or applications.⁷¹ By June 1962 DDR&E Brown testified to Congress that in the past the Dynasoar had been improperly presented as leading toward an operational system: "That has never been accepted as the purpose by the DOD and it is not now so accepted. What was accepted as a program was a vehicle which would serve to develop the technologies associated with manned space flight and some particular applications - not uses. . ." like short notice deorbit and landing. Brown was emphatic when he stated, "However, we [OSD] have not supported specific military uses for such a vehicle, be it destructive of other vehicles, be it maintenance and repair of satellites or whatever, because it is not possible to lay down military needs which would be fulfilled in an obviously useful way by such a vehicle."⁷²

An official Air Force history added that by mid-1962 the dual Dynasoar reorientation process was complete and McNamara had approved a budget of \$135 million for Dynasoar. However, he also ". . . instructed that technical confidence and data acquisition would have precedence over flight schedules. It was quite clear that the X-20 Dyna-Soar program was exclusively an experimental program which was directed towards demonstrating the ability of the Air Force to orbit the glider, reenter, and land at a pre-selected site. . . . The X-20 program was not directed towards developing a weapon system, nor even defining future military applications of the dynamic-soaring glider [because] such references had been deleted."⁷³

⁷⁰ Subsequently to this name change, the Dynasoar program was referred to interchangeably as either the X-20 program or as the Dynasoar program. This dissertation will reflect that practice.

⁷¹ Houchin, *Rise and Fall of Dyna-Soar*, 208.

⁷² Harold Brown to the Senate space committee, June 1962, as cited by George C. Wilson, "Defense Denies Bid for NASA Programs," *Aviation Week and Space Technology* (June 25, 1962): 34.

⁷³ AFSC, *History of the Aeronautical Systems Division, January-June 1962, Volume I (Narrative)*, AFSC Historical Publication Series 62-52-1, 1962. K243.011, AFHRA, pp. I-53 through I-54. Declassified at author's request.

Although one might expect that the Air Force would have cheered the reorientation of the Dynasoar toward an orbital vehicle, this was not the case. Explained Roy Houchin, the foremost Dynasoar scholar, this reorientation “. . . placed Dyna-Soar in a perilous position. Its mission competed with NASA’s Mercury and Gemini programs for the manned space mission and with the NRO’s unmanned satellites for the national reconnaissance mission. . . . While only a few officials within OSD knew about them, NRO’s highly classified unmanned reconnaissance satellites were fulfilling the military requirement to gather information, even if they could not make conventional landings. . . . Without knowing what type of reconnaissance systems it had to compete with, Dyna-Soar’s proponents found it much harder to sell their system to OSD.”⁷⁴ On October 23, 1963 McNamara reportedly asked William E. Lamar, Director of Dynasoar Engineering, “What can the X-20 do that SAMOS can’t do?” Lamar replied, “I don’t know. I’m not cleared for the program.” To which McNamara could only respond, “Well, you should be.”⁷⁵ The threat to Dynasoar’s viability due to perceived duplication came not only from NASA’s Gemini, but from NRO’s robotic spacecraft, although the latter factor is difficult to directly assess due to the continuing high level of secrecy and classification pervading NRO’s history.

It was simply a matter of time before OSD, and others, would accuse Dynasoar of multifaceted duplication: “Knowing the military capabilities of NRO’s reconnaissance satellites, the ability of NASA to place a man in orbit, and the burgeoning promise of NASA’s Gemini program to perform military requirements in space, OSD officials began to question the need for a separate Air Force-sponsored manned spaceflight program.”⁷⁶ Houchin also made clear that, “The Air Force faced a ‘Catch-22.’ How could it demonstrate a military need for man-in-space before it placed one in space to prove his capabilities? Ultimately, Dyna-Soar proponents would have to prove their point by quantifying and qualifying Dyna-Soar against space systems they knew little, if anything, about.”⁷⁷ Indeed, the chairman of the House space

⁷⁴ Houchin, *Rise and Fall of Dyna-Soar*, 4, 175.

⁷⁵ *Ibid.*, 221.

⁷⁶ *Ibid.*, 218.

⁷⁷ *Ibid.*, 219-20.

committee declared in September 1962 concerning the X-20's objectives of rapid launch, space maneuverability, flexible reentry, precision recovery, and conventional landing and reuse: "NASA is already conducting a program, Project Gemini, designed to accomplish all of these objectives several years sooner than will be possible with the X-20." In addition, Representative Miller pointed out that Gemini was much lighter than the X-20, much smaller, much less expensive, and could carry two men instead of one.⁷⁸ By December Golovin in the OST was urging "... the X-20 project be either canceled or drastically reduced, and DOD assigned all or a major part of the responsibility for development of the Gemini system" and that "the DOD space program be explicitly broadened to include early application of Gemini or Gemini-modified systems for reconnaissance and surveillance, and associated military operations, in near-earth space."⁷⁹ See above for the resulting events in the NASA-DoD Gemini struggle.

NASA's Interest in Dynasoar Waned

The official government position concerning Dynasoar was that it was a "... manned test vehicle capable of maneuverable re-entry from orbit to a conventional landing at an air base which can be selected by the pilot." There was no mention of potential military applications, only its scientific R&D components.⁸⁰ One might expect NASA to have cheered this aspect of the reorientation. This, however, was also not the case. In fact, another consequence of reorienting Dynasoar away from a suborbital vehicle to an orbital vehicle was the loss of genuine NASA interest in the project. As long as the vehicle was predicated on the notion of exploring the hypersonic flight regime within the atmosphere, NASA had a legitimate interest in the glider. However, when Dynasoar's primary R&D objective became exploration of the orbital challenges of maneuverable re-entry and landing at conventional air bases, NASA's interest waned. As NASA's chief for high-speed aerodynamics R&D John Becker explained, "NASA's influential involvement with Dyna-Soar came to an abrupt end in 1961." The OSD's dual reorientation of the Dynasoar described above only became known to NASA through William Lamar, the director of Dynasoar en-

⁷⁸ Representative George Miller, Speech, *Congressional Record*, September 6, 1962, p. 18673.

⁷⁹ Nicholas E. Golovin, Memorandum to Jerome Wiesner, Suggestions Concerning the National Space Program, December 21, 1962, *supra*, 11.

⁸⁰ *U.S. Aeronautics and Space Activities, 1961*, January 31, 1962, *supra*, 36.

gineering. Lamar "... rather apologetically informed us during the fall of 1961 of the drastic re-direction that was to be implemented in December 1961, without any participation or consultation with NASA."

As a result of the elimination of Dynasoar's suborbital hypersonic research flights.

As far as our NASA DS [Dynasoar] team was concerned, Dyna-Soar as a research airplane was dead. During the remaining two years of Dyna-Soar's existence NASA continued as a largely inactive nominal partner, completing the tests to which we were committed. It was now obvious that the USAF was interested in DS only as a prototype of an orbital system and not as a research vehicle. . . . As time went on it also became increasingly apparent that USAF did not have a clear believable vision of what their orbital system requirements really were, and thus doubts increased as to whether DS-1 was an appropriate development vehicle. . . . The Air Force has essentially eliminated NASA from policy decisions.

Becker summarized that NASA had 55 personnel continuously working on Dynasoar support; through the end of 1961 they had devoted 3,900 hours of wind tunnel time to Dynasoar R&D.⁸¹ By February 1963 NASA had devoted 6,135 hours of time in its various wind tunnels to Dynasoar R&D.⁸²

In March 1962 the NASA Dyna Soar Coordinating Committee concluded, "The Dyna-Soar Project has changed in character from the X-15 type of hypersonic and reentry research and test system originally contemplated to a prototype for possible military space systems. Air Force emphasis is now being placed on exploring the potential of man to accomplish military functions in space, a mission which this system is poorly designed to accomplish. NASA was not represented in the technical management deliberations leading to these drastic changes and our subsequent objections have been largely overruled." The Committee explained that if the original November 14, 1958 NASA-AF Memorandum of Understanding on Dyna-Soar, which declared Dynasoar a joint project (see chapter 5), continued in force, "NASA will be held jointly responsible with the Air Force for the doubtful outcome of this project while in fact its destiny is being decided wholly by the Air Force." The Committee felt there was enough research value left in the Dynasoar vehicle as a "highly maneuverable radiation-cooled manned reentry vehicle" to warrant some

⁸¹ John Becker, Research Division Chief, NASA High-Speed Aerodynamics Division, "The Development of Winged Reentry Vehicles: An Essay From the NACA-NASA Perspective, 1952-1963," in Richard P. Hallion, editor, *The Hypersonic Revolution: Eight Case Studies in the History of Hypersonic Technology*, volume 1 (Wright-Patterson AFB, OH: Special Staff Office, Aeronautical Systems Division, 1987), 434, 437-38.

⁸² NASA, Chronology, NASA Participation in X-20 Project, March 13, 1963, folder: Dyna Soar Proposals & Evaluation, DoD subseries, Federal Agencies series, NHDRC, Tab B, 3.

continued NASA support. However, "This can be supplied in the traditional manner without the necessity for a joint project." Therefore, NASA should terminate the categorization of Dynasoar as a joint NASA-DoD project.⁸³

NASA's institutional dissatisfaction with recent developments and concern over its future role in the Dynasoar program caused Webb to write Zuckert and explain, "A number of events have occurred which have prompted us to reexamine this project and our relationship to it." Webb said they should create a new memorandum of understanding with a "more accurate statement of NASA participation in the remainder of the program." Webb explained NASA still supported research on "the problems of highly maneuverable winged vehicles in the critical environment of the hypersonic flight corridor." However, "The additional uses of the glider by the Air Force as a space vehicle for exploring the potential of man to accomplish military functions in space are considered beyond the scope of NASA interests." While NASA was ready to "provide continuing technical support in the form of consultation and ground based testing," it no longer wished to be listed as a partner in the program.⁸⁴

Accordingly, Webb and Zuckert signed a new memorandum of understanding on August 7, 1962 which simply stated, "Dyna-Soar is an Air Force Program." The document did explain that certain aspects of Dynasoar R&D such as exploring high maneuverability at hypersonic speeds with a conventional landing did interest NASA and therefore, "NASA endorses this objective as necessary to the national aero-space program." However, NASA's future role would be limited to "technical support (consulting and ground-facilities testing)" and "instrumentation and flight test support."⁸⁵ From this point forward NASA's official role would be distinctly circumscribed. Unofficially, however, and in the minds of high-

⁸³ Minutes of the NASA Dyna Soar Coordinating Committee meeting, March 30, 1962, as an attachment to a memorandum from a NASA official Mr. Dixon, to Deputy Administrator Dryden, NASA Participation in Dyna Soar Program, April 2, 1962, folder: X-20 Correspondence, DoD subseries, Federal Agencies series, NHDRC, 2.

⁸⁴ Webb, Letter to Zuckert, May 28, 1962, folder: Webb, declassified papers, 1961-1968, Webb subseries, Administrators series, NHDRC, 1-2.

⁸⁵ Webb and Zuckert, Memorandum of Understanding, Principles for NASA Participation in Dyna-Soar Program System 620A, August 7, 1962, folder: Dyna-Soar, DoD subseries, Federal Agencies series, NHDRC, 1.

level OSD officials. NASA played a central role in Dynasoar's fate because the capabilities of its Gemini system, when augmented by a cylindrical laboratory, were seen as a more capable, cheaper, and earlier available human spaceflight alternative for the Air Force.

Dynasoar and Gemini

McNamara Ordered a Comparative Review

One source calculated that by the end of FY62 the Air Force had spent \$240 million on the Dynasoar with only a full-scale mockup to show for these expenditures (it should be remembered that the entire Mercury program would cost under \$400 million) while it would cost an estimated \$1.3 billion to continue Dynasoar through its first piloted flight in 1966. Consequently, the X-20 program was coming under increased scrutiny in the fiscally-minded OSD.⁸⁶ Only a few days before McNamara and Webb finally reached their NASA-DoD Gemini agreement on January 21, 1963, and virtually simultaneously with his rejection of the USAF's MODS and Blue Gemini proposals, McNamara informed DDR&E Brown: "I should like to review in detail the DYNASOAR program" both in Washington, DC and at the main contractor facilities. McNamara explained, "In particular, I am interested in considering the relationship of DYNASOAR to GEMINI and the extent to which the former will provide us with a valuable military capability not provided by the latter." One day later he added, "I am interested in the extent to which the Gemini program as presently conceived by NASA will meet our military requirements."⁸⁷ McNamara openly pondered the X-20's fate before Congress in early 1963: "Do we meet a rather ill-defined military requirement better by proceeding down that track [spending \$1 billion more on the X-20] or do we meet it better by modifying Gemini in some joint project with NASA?"⁸⁸ In less than one year McNamara would become convinced that NASA's Gemini did (when attached to a laboratory cylinder), in

⁸⁶ Derek W. Elliott, *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963* (Ph.D. dissertation, George Washington University, 1992), 210.

⁸⁷ McNamara to Brown, two memoranda, January 18 and 19, 1963, folder: 6 - 1963, Air Force, box B129, Curtis LeMay papers, LoC, both p. 1.

⁸⁸ McNamara testifying before the House Armed Services Committee, January-February 1963, cited in *Government Operations in Space*, 80.

fact, better meet the OSD's military requirements for a human spaceflight program, focused on the reconnaissance mission, than did Dynasoar.

Webb recorded a conversation he had with McNamara in February 1963 concerning Dynasoar in which McNamara stated, "He was prepared to look carefully at the values that might be retained from the Dynasoar program, although he had serious doubts that there were any values in it worth the eight or nine hundred million dollars that it was costing."⁸⁹ Privately, Webb confided his personal views on Dynasoar: "... as an orbital vehicle it is going to be obsoleted by both Gemini and Apollo and that what we need now is careful, thoughtful work on hypersonic re-entry."⁹⁰ Also in February 1963 Zuckert reported to McNamara that a congressman had asked him while testifying to the House Appropriations Committee about McNamara's opinions concerning the Dynasoar program: "I told him that I realized it was your disposition to cancel or substantially reorient the Dynasoar program, but that this matter had not finally been settled."⁹¹ A final indication of McNamara's skepticism toward the X-20 program even before his formal review of it in March 1963 was his testimony to the House in February: "It appears to me that Gemini is advanced beyond the Dyna-Soar in technique and potential. There is no clear requirement, in my mind, at the present time for manned military operations in space. . . . But were we to require manned military operations in low earth orbit, it appears to me that the Gemini approach is a far more practical approach."⁹² Even before McNamara's review trip the trade press was speculating, "For all intents and purposes, the Dyna-Soar (X-20) program is dead. There will now be a family discussion on the best way to bury the body."⁹³

⁸⁹ Webb, Letter to Boone, February 13, 1963, folder: X-20 Correspondence, DoD subseries, Federal Agencies series, NHDRC, 1.

⁹⁰ Webb, Letter to Dr. Arthur E. Raymond, NASA Consultant, February 13, 1963, folder: Webb Correspondence, Jan-Jun 1963, Webb subseries, Administrators series, NHDRC, 2.

⁹¹ Zuckert, Memorandum to McNamara, February 26, 1963, folder: 6 - 1963, Air Force, box B129, Curtis LeMay papers, LoC, 1.

⁹² Cited in Laurence Barrett, "The Death of the Dyna-Soar Project," *New York Herald Tribune*, December 26, 1963.

⁹³ William J. Coughlin, "Eulogy to a Dyna-Soar," editorial, *Missiles and Rockets* (March 11, 1963): 50.

In March McNamara embarked on an intense review of the X-20 program which included briefings not only in Washington, DC but tours of the facilities across the country of the major contractors for the glider itself and its launch vehicle, such as the Martin Corporation and Boeing, as well as similar facilities associated with the Gemini program. Assistant Secretary of the Air Force for R&D Brockway McMillan provided the best synopsis of McNamara's tour:

It was clear that the briefings on Dyna-Soar opened Mr. McNamara's mind in a way it had not been opened before on the point of Dyna-Soar as a space vehicle rather than as a research vehicle. . . . [However] Mr. McNamara several times said that he was concerned that in the Dyna-Soar project we were putting too great an emphasis on controlled re-entry when we didn't even know what we were going to do in orbit. He felt the first emphasis should be on what missions can be performed in orbit and how to perform them, then worry about re-entry at a later date. In other words, start looking at the problem from the end objective . . . and then worry about secondary problems like controlled re-entry at a later time.

It is not clear at this point that Mr. McNamara is willing to buy Dyna-Soar. In any event, he is not going to cancel it right away. He is clearly arguing with himself and several times raised the same questions. . . . It is clear that Mr. McNamara is concerned with the great cost of space flight and the great cost to the taxpayer of Gemini and Dyna-Soar. It is also clear that he feels we will have to have some kind of test bed in space - presumably manned - in order to test out concepts related to manned space flight. . . . He suggested that we take as much as six months to study, what in the long run, would be the optimum test bed for military space. He thought it might be space stations serviced by a ferry vehicle.⁹⁴

McNamara had, in effect, given Dynasoar a six-month lease on life. When he returned from his review trips he tasked the Secretary of the Air Force with a detailed examination of the Dynasoar and Gemini programs and their relation to the four most likely DoD space missions: inspection and identification of hostile satellites; protection of our own satellites from destruction; the capability of carrying out reconnaissance missions from space; and the introduction of offensive weapons into near-earth orbit. McNamara alluded to the Dynasoar in his memo to Zuckert: "It appears to me that too much emphasis and too much money has been placed on the development of certain techniques such as controlled re-entry and not enough attention has been directed to the specific military missions to be performed. In particular, I am interested in reviewing the contribution which the X-20 and GEMINI programs can make to

⁹⁴ Brockway McMillan, Assistant Secretary of the Air Force for Research and Development. Memorandum to Zuckert, March 15, 1963, documents in the possession of Major Roy Houchin, AFHSO/Pentagon, 1-2.

each of the missions referred to above.”⁹⁵ McNamara summarized his conclusions after his Dynasoar review to the House: “I seriously question whether our nation requires that both programs be completed. We have no clear military requirement for either.”⁹⁶ He told *Missiles and Rockets* that “. . . perhaps the Gemini project can be modified with relative slight effort to better meet the Air Force’s needs for capabilities in manned spaceflight, it may be possible for the Air Force to cut back the Dyna-Soar project substantially.”⁹⁷

The Air Force Response

The USAF’s response to McNamara’s March 15 tasking order indicated that as an institution it was unwilling to strongly endorse either Dynasoar or the Gemini as the best system for the four missions McNamara described. AFSC’s Space Systems Division’s (SSD) bottom line was, “Neither vehicle can, through modification, acquire all the characteristics desired of a military space system for routine operational use.” SSD did present in detail the advantages and disadvantages of each system as they related to McNamara’s four specified missions. But it made no firm recommendations as to how the Secretary of Defense should proceed.⁹⁸ McMillan incorporated SSD’s ambiguity in the memo that actually went to McNamara, reiterating, “Our analysis shows that neither the X-20 program . . . nor the NASA Gemini program as presently defined will provide significant capabilities relative to the four missions. There is a very limited operational capability inherent in the two vehicles.” McMillan passed on AFSC’s analysis of the pros and cons of each system for the particular missions but in the end concluded, “Neither the DOD

⁹⁵ McNamara. Memorandum for the Secretary of the Air Force, March 15, 1963, folder: Reading File, February-May 1963, box 117, RG 200, Robert McNamara papers. NARA, 1. Declassified at author’s request.

⁹⁶ Edward H. Kolcum, “Defense May Ease Impact of X-20 Loss,” *Aviation Week and Space Technology* (March 18, 1963): 31.

⁹⁷ *Missiles and Rockets*, April 1, 1963, p. 46, cited in Stephen I. Grossbard, *The Civilian Space Program: A Case Study in Civil-Military Relations* (Ph.D. dissertation, University of Michigan, 1968), 220.

⁹⁸ Space Systems Division, AFSC, Response to Secretary McNamara’s 15 March 1963 Questions, May 10, 1963, a document from the collection, *History of the Aeronautical Systems Division, July-December 1963, Volume IV, Termination of the X-20A Dyna-Soar (Documents)*, AFSC Historical Publications Series 64-51-IV, K243.011, AFHRA, 3ff. Declassified at author’s request.

X-20 nor the NASA Gemini program as presently defined will produce on-orbit operational capabilities of any military significance.” Therefore, both programs should be continued.⁹⁹ Since the USAF appeared unwilling to decide between Dynasoar and Gemini, it would fall to the OSD, and particularly the Office of the DDR&E, to do so. Therefore, “If by July 1963 Dyna-Soar was not dead, its hold on life was at best tenuous.”¹⁰⁰ Indeed, in July 1963 McNamara limited Dynasoar FY64 funding to \$125 million per year for the indefinite future, \$10 million less than FY63’s level.¹⁰¹

MOL Emerged As Dynasoar Expired

On August 29, 1963 Senator Clinton Anderson wrote Deputy Secretary of Defense Gilpatric to ask him what the situation was with Dynasoar: did the DoD plan to continue the program or not? Gilpatric replied that the relative military usefulness of Gemini and Dynasoar “. . . is the most difficult question facing me. In fact, neither Gemini nor Dyna Soar, in their present form, can perform a genuine military mission. . . . The fundamental point is that no militarily useful mission to which these vehicles could contribute has been defined, although we have studied the problem intensively for several years. Should a mission be defined, it might favor one or the other approaches, but most likely would require the initiation of a third approach to circumvent the obvious limitations of the other two.”¹⁰² In fact, the OSD was already considering a third approach by September. This third approach was MOL, a Gemini capsule with an attached laboratory module. On December 10, 1963 McNamara officially sanctioned it and canceled Dynasoar.

Webb, McNamara and Space Stations

One bone of contention resulting from the NASA-DoD Gemini agreement of January 1963 was at exactly what point in NASA’s exploratory space station studies was NASA required to obtain “mutual

⁹⁹ Brockway McMillan, Memorandum for the Secretary of Defense, Review of Air Force Space R&D Program, June 5, 1963, p. 3-4, contained in *ibid.* Emphasis in original.

¹⁰⁰ Cantwell, *Air Force in Space, FY63*, 15.

¹⁰¹ Houchin, *Rise and Fall of Dyna-Soar*, 251.

¹⁰² Gilpatric, Letter to Clinton P. Anderson, September 27, 1963, folder: III Armed Services, box 584, Clinton Anderson papers, LoC, 2-3.

agreement" with the DoD that it was not "initiat[ing] major new programs or projects in the field of manned space flight aimed chiefly at the attainment of experimental or other capabilities in near-earth orbit."¹⁰³ McNamara took a restrictive view of this clause, believing that DoD should be involved in NASA space station exploratory studies from an early point. Webb interpreted it more liberally, not wanting to sacrifice NASA's autonomy, and said that as long as NASA was engaging only in paper studies, either in-house or with contractors, and not actually building hardware, it was not required to consult with the DoD.

Webb wrote McNamara that there appeared to be a "lack of a meeting of the minds concerning the proper coordination between NASA and the DOD in the area of exploratory studies. . . . We feel here in NASA that we must constantly be looking well into the future in order that our progress will be such as to achieve and maintain a position of world leadership for the United States in field of space sciences and technology." Concerning space station exploratory studies, "In my view, such advanced exploratory studies do not fall within the purview of existing DOD-NASA agreements as they relate to the initiation of 'major new programs or projects.'"¹⁰⁴ McNamara simply included his response to Webb into a reply he made to Lyndon Johnson when the Vice President asked McNamara and Webb for their opinions on the five space-related questions Kennedy had asked Johnson in 1963 (see chapter 6). McNamara maintained, "It is essential that all major space programs be integrated with military requirements in the early stages of their development. . . . I am more concerned with the potential dangers in the divergence of our efforts in the study and planning of potential new large projects" such as the space station. Concerning a space station, McNamara declared, "While it is not yet clear that the project is that the project is justified, either on a military or non-military basis, it is clear that it should be undertaken only as a national program, which meets the requirements of both NASA and DoD, and that it must be jointly planned from its inception. . . . Coordination and joint planning of our efforts must extend to all so-called 'advance studies.'"¹⁰⁵

¹⁰³ This wording is from the January 21, 1963 Webb-McNamara/NASA-DoD agreement on Gemini.

¹⁰⁴ Webb, Letter to McNamara, April 24, 1963, SPI document 1457.

¹⁰⁵ McNamara, Report to Lyndon Johnson, May 3, 1963, National Space Program, in Logsdon et. al., *Exploring the Unknown, Volume II*, supra, 342-47.

More pointedly in a letter to Zuckert, McNamara admitted that he concurred in Zuckert's assessment that the DoD should be awarded the space station mission: "I agree that this assignment, and the near-earth interests of the DOD, might be considered logical reasons for assigning to the DOD this new undertaking."¹⁰⁶

Throughout May and June 1963 Webb and McNamara exchanged numerous letters but the deadlock over what was and was not an acceptable level of coordination on space stations and exploratory studies of them continued. McNamara sent Webb pre-signed agreements that Webb could not sign. Webb did the same in return to McNamara.¹⁰⁷ In the midst of this, McNamara continued to try to move the Air Force toward some recommendation on the Dynasoar-Gemini situation. He wrote Zuckert late in June: "The Department of Defense will be faced with major new program decisions regarding manned space flight within the next year. Since space vehicle developments are so expensive it is necessary that we utilize every opportunity to minimize the number of separate developments." Therefore, he ordered Zuckert to submit "... a plan for insuring the integration of the several study efforts now underway which may involve GEMINI and thus provide additional basis for comprehensive program decisions in the area of manned space flight as it relates to military missions."¹⁰⁸

Later that summer Brown provided Zuckert additional OSD guidance on what OSD had in mind for an Air Force orbital platform. He authorized Zuckert to spend \$1 million dollars on the study McNamara had ordered and added, "Because of the national importance which could be attached to the outcome of this work, the Secretary of Defense and I will have a more detailed interest than usual in its progress." Brown then gave the USAF specific guidance:

The immediate objective to which this study must be directed is the building of a space station to demonstrate and assess quantitatively the utility of man for military purposes in

¹⁰⁶ McNamara, Memorandum for the Secretary of the Air Force, A National Orbital Space Station Program, May 25, 1963, folder: May 31-May 18, 1963, Reading File, box 117, RG 200, Robert McNamara papers, NARA, 1. Declassified at author's request.

¹⁰⁷ See Boone, *NASA Office of Defense Affairs*, 88ff., for the bureaucratic wrangling.

¹⁰⁸ McNamara, Memorandum for the Secretary of the Air Force, Recommendation of the Gemini Program and Planning Board, June 20, 1963, folder: Reading File, June 20-June 29, 1963, box 118, RG 200, Robert McNamara papers, NARA, 2.

space. The space station so contemplated would be a military laboratory, and its characteristics must be established with some specific mission in mind if its function is to be a genuine military one. The principal missions to be considered are those that can be included in a broad interpretation of reconnaissance: surveillance, warning and detection can be considered in this context. Other missions such as those assuming the use of offensive and defensive weapons shall not be considered unless it can be explained in detail how such missions might be done better from a space station than any other way.

The successful conclusion of this study must provide answers to at least the following questions: What specific answers about what specific military capabilities will the space station answer? . . . What is the smallest kind of space station which will still provide a meaningful demonstration and measurement of man's utility?¹⁰⁹

Clearly, within OSD, the need for some kind of an orbital platform to finally test, once and for all, if military officers had any justifiable reason to operate in space, had now been established. The MOL was edging closer to reality. However, even as such a long-duration orbital platform seemed more and more certain because OSD now wanted such a test bed, this meant that Dynasoar's chances for survival dimmed, given the drive for eliminating duplication and cost efficiency inherent within PPBS and systems analysis.

While the situation was thus finally becoming clarified within the DoD concerning the need for some kind of an orbital testing of the military requirements of human spaceflight, the exact balance between NASA and the DoD concerning responsibilities in this area was not. McNamara and Webb could not agree on the degree and level of coordination required for their respective space station exploratory studies. It finally took vice presidential intervention to clarify the situation. At a NASC meeting on July 17, 1963, both Webb and McNamara expressed satisfaction over the progress of and level of coordination in the Gemini program since the promulgation of the January 1963 agreement. But when the discussion turned to space stations, Johnson asked if the various study contracts required mutual agreement. Predictably, "Webb answered the question about the need for agreement on studies in the negative and said, 'Not in my view.' He continued that NASA will furnish DOD outlines of its studies for comment and discussion but not for concurrence. He did not believe anyone else should have a veto over studies NASA proposed." McNamara then entered the discussion: ". . . he differed with Webb by stating that he did feel

¹⁰⁹ Harold Brown, Memorandum to the Secretary of the Air Force, Military Orbiting Space Station, August 30, 1963, in *History of the Aeronautical Systems Division, Documents*, supra, 1-2. Emphasis in original.

that the other party should agree before a study is pursued, and that, if an agreement can't be reached, the matter should come to the Vice President or President to be settled." Webb interjected that the issue was largely academic because men could stay up in the Apollo capsule for 2-3 months and so "we may not need a space station for some years in the future."¹¹⁰

Shortly thereafter, Johnson sent each man an identical letter stating, "I was pleased to note both you and Secretary McNamara/Administrator Webb expressed satisfaction with the coordination existing in the Gemini program. . . . The situation regarding space stations was less clear, however, and I would like to get your best thinking as to what needs to be done." Therefore, each was to submit "a paper expressing the possible uses of space stations. . . ."¹¹¹ Webb's response recognized that any space station would not only be a major undertaking but also "a mandatory forerunner of any long-duration manned space operational system." Therefore, a single national program should be able to meet "the initial technological requirements of all interested parties." Concerning whether NASA or DoD should manage the initial project Webb simply said that after all study efforts were completed the NASC should forward to the President a ". . . recommendation as to management responsibility based on predominant interest and consideration of other pertinent factors, such as management competence, relation to other programs in progress, and international political implications." He added that NASA's interest in a first-generation station was in the fields of biomedical experiments, engineering R&D, and space science.¹¹²

McNamara's response also foreshadowed his backing of the MOL and pending cancellation of the Dynasoar: "The real potential of manned space flight may not be understood until there has been the opportunity to conduct a program of long-duration multimanned orbital flights in a facility which permits

¹¹⁰ NASC, Summary Minutes, Gemini and Space Station Meeting, July 17, 1963, folder: July 17, 1963 NASC meeting, box 3, RG 220, Records of the National Aeronautics and Space Council, NARA, 3-5.

¹¹¹ Johnson, Letters to McNamara and Webb, July 22, 1963, folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified Items, NHDRC, 1.

¹¹² Webb, Memorandum for the Vice President, Space Stations, August 9, 1963, folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified Items, NHDRC, 1-3.

men to move about and perform useful tasks." The Dynasoar, in its present configuration, did not permit officers to orbit for long periods, had only one person, and did not permit people to move about. Concerning the specific military uses of a space station McNamara postulated, "It may be that reconnaissance and surveillance techniques could be improved by human judgment and adaptability" and so a space station "may provide a platform for very sophisticated observation and surveillance." McNamara did add that orbital bombardment "does not appear to be an effective technique at the moment."¹¹³

Apparently the direct involvement of Johnson in the Webb-McNamara space station dispute was enough not only to finally bring about a NASA-DoD accord on space station planning but also to increase the momentum for acceptance of MOL within the OSD. The NASA-DoD Agreement Covering a Possible New Manned Earth Orbital Research and Development Project of August/September 1963 stated that the two organizations' advanced exploratory studies on space stations and any follow-on actions ". . . should be most carefully coordinated through the Aeronautics and Astronautics Coordinating Board. . . . in so far as practicable all foreseeable future requirements of both agencies in this area should be encompassed in a single project." There followed an eight step administrative procedure detailing: exactly how NASA and DoD would coordinate their continuing advanced studies through the AACB; and that the Secretary of Defense and NASA Administrator would jointly determine whether or not a space station program should be started and then formulate a recommendation to the President as to managerial responsibility. If the President accepted their recommendation then NASA and the DoD would form a joint board to formulate the specific objectives of the newly-approved space station program. However, the project would be under single agency management, in accordance with the presidential decision. There was also an attachment to the agreement entitled "Procedure for Coordination of Advanced Exploratory Studies by the DOD and the NASA in the Area of Manned Earth Orbital Flight Under the Aegis of the Aeronautics and Astronautics

¹¹³ McNamara, Memorandum for the Vice President, Space Stations, August 9, 1963, folder: NASC, 1962-1972, box: National Aeronautics and Space Council, NHDRC, 1-2.

Coordinating Board" which spelled out exactly how the AACB's Manned Space Flight Panel would coordinate NASA's and the DoD's space station studies.¹¹⁴

When McNamara finally signed this agreement, almost a month after Webb sent it to him, he offered several serious reservations to it centering on the fact that NASA continued to design space stations without DoD input but yet still insisted a single orbital platform would have to meet both agencies' needs. The core impression from McNamara's letter is that he seemed simply to have been fed up with the whole question, stating, "We have discussed this matter as much as is useful." He therefore signed it and hoped Webb would accept his reservations and instruct his staff to obtain DoD input on any space station studies budgeted at greater than \$100,000 in a single year.¹¹⁵ When it was all said and done, the AACB's Manned Space Flight Panel formed a National Space Station Planning Subpanel to enforce this NASA-DoD space station agreement. However, this subpanel met only four times and "then lapsed into inactivity."¹¹⁶ This whole infrastructure created to carefully coordinate the NASA and DoD space station programs played absolutely no role in the MOL design and approval process because the senior leadership of both agencies "... chose to regard MOL as something other than a space station, hence not covered by the September agreement."¹¹⁷

Approving MOL/Canceling Dynasoar

By late October 1963 McNamara wanted to take another tour of the primary Dynasoar and Gemini facilities so he could conduct another intensive review of the Dynasoar program, just as he had in

¹¹⁴ Webb and McNamara, Agreement Covering a Possible New Manned Earth Orbital Research and Development Project, with attachment, August 17, 1963 for Webb's signature, September 14, 1963 for McNamara's signature, in Logsdon et. al., *Exploring the Unknown, Volume II*, supra, 357-58.

¹¹⁵ McNamara, Letter to Webb, September 16, 1963, Logsdon, et. al, *Exploring the Unknown, Volume II*, supra, 359-60.

¹¹⁶ Boone, *NASA Office of Defense Affairs*, 93. Likely explanations for the Subpanel's lack of substance, after all the months of McNamara-Webb dissension over space station planning can be found in two factors. First, Webb had no desire for a large and capable, yet expensive, NASA-managed space station program that would compete internally with the Apollo program for NASA budgetary priority. Second, once McNamara endorsed the MOL system in December 1963 the OSD also had no desire to seriously plan for any kind of a larger, more capable, next generation space station until the results of the various experiments to be conducted on MOL could be performed and analyzed.

¹¹⁷ Levine, *Managing NASA in the Apollo Era*, 149.

March. The difference this time was that in the interim he had come to accept the need for some sort of a multi-manned, large orbital test bed for military experiments in which more than one officer could live for an extended period and have the ability to move around. The Dynasoar's prospects looked bleak. Assorted records of the questions McNamara asked while on this tour show his disposition toward the concept of a laboratory module attached to the Gemini and against the Dynasoar.

The crucial briefing of McNamara's tour seems to have been on October 23. William Lamar, the Air Force's director of engineering for Dynasoar, recorded that McNamara's real interest was in getting answers to his basic questions of "a. What does the military want to do in space, and why? b. What is the relative cost effectiveness of manned and unmanned space systems, and how do they compare with other means of doing the job?" Over the course of the discussion that day Lamar said it became clear that "Mr. McNamara considers it essential to the future of the X-20A and the Air Force manned program in space to obtain an answer to the very basic question of 'why the military should be in space, and with a manned system.' He wants to know what the military wants to do in space and why. . . . He feels that a space system will be expensive and he does not understand why the Air Force wants to establish a mission by such an expensive method. He has asked these same questions a number of times over the past few years." Lamar added, "It was quite evident that Mr. McNamara felt considerable progress should have been made in obtaining answers to his questions. . . . He is not satisfied with the answers he received, and drastic consequences are likely if better answers are not forthcoming."¹¹⁸

In a separate memo Lamar created a paraphrased transcript of the actual question and answer session on that day. In it McNamara is presented as remarking, "I want to know what is planned for the X-20 after maneuverable re-entry has been demonstrated. I cannot justify the expenditure of \$1 billion for a program that is dead-ended. I am not engaging in additional Dyna-Soar expenses until I have an un-

¹¹⁸ William Lamar, Memorandum for Record, X-20A Program Briefing to Secretary of Defense McNamara at Denver, Colorado, undated by sometime shortly after the October 23, 1963 briefing, contained in *History of the Aeronautical Systems Division, Documents*, supra, 1-2. Numerous other accounts of the session corroborate Lamar's synopsis. See Major General R.G. Ruegg, USAF, Personal message to Schriever, 23 October 63 X-20 Status briefing to McNamara, dated October 29, 1963 *ibid.*; and J.H. Goldie, Memorandum to George Snyder, Questions, Comments, and Impressions from McNamara Briefing October 23, 1963, dated October 24, 1963, *ibid.* (both men were senior officials at Boeing, the main contractor for the Dynasoar vehicle). All declassified at author's request.

derstanding of what the space missions are. . . . It is imperative that a mission analysis be conducted in order to determine what has to be done. . . . the program will not have security until its purpose is fixed." Perhaps McNamara's attitude was best summarized by his question, "What does man do other than fly the vehicle?" This was quickly followed by an implied warning, "We are planning to spend a large amount of government resources when in fact we don't know why. In other words, we don't have a clear purpose in mind for follow-on use of the Dyna-Soar technology." When a Boeing official stated that the Air Force had repeatedly explained that reconnaissance was the primary justification for the Dynasoar, McNamara replied, "Agreed, but I can do it cheaper. . . . Is it worth \$25 million per launch for the single orbit reconnaissance mission? I want to know what the military space missions are and how they get done."¹¹⁹

McNamara's critique of a supposed Air Force failure to elucidate the Dynasoar's mission seems not entirely fair. First, the Air Force did in fact frequently explain Dynasoar would supply the ability to gather intelligence information over any portion of the globe on demand and in a short period of time. This was compared to the robotic reconnaissance satellites which were limited to covering the area directly beneath their orbital plane, although some limited adjustment to their coverage was possible in the early satellites. Second, McNamara seemed to have been searching for additional military applications which Dynasoar could perform. Yet this was the very role which McNamara had forbade the Air Force to explore in his dual reorientation of late 1961/early 1962. By late 1963 he was asking the Air Force to supply him with information resulting from investigations he had specifically prohibited it from performing for almost two years. NASA Associate Administrator Seamans accompanied McNamara not only to all the briefings during the October tour but spoke with him extensively during the hours of the aircraft flights. Seamans simply stated, "I could tell McNamara had made up his mind to cancel it [Dynasoar] and was looking for a good rationale. I could tell that whatever he saw in Houston [concerning NASA's Gemini program], he'd made up his mind he liked. He was all exuberant about our Gemini program." While McNamara did not overtly state on the flight back to Washington, DC that he had decided to cancel

¹¹⁹ William Lamar, Paraphrased Transcript of Discussion After X-20 Status Briefing to Mr. McNamara by Colonel Moore in Denver 23 October 1963, also dated October 23, 1963, *ibid.*, 3, 4, 6. De-classified at author's request.

terminate the X-20, "I knew damn well he had and justified it on the basis that we had the Gemini program."¹²⁰ As Houchin said concerning McNamara's demand that Air Force officers supply specific information relating to the Dynasoar's military applications: "for their answers to be useful, the secretary needed to be listening."¹²¹

Third, two of the missions the Air Force had concluded Dynasoar could fulfill were as a delivery platform for nuclear weapons and as a satellite interceptor/inspector/neutralizer. However, with the adoption of UN General Assembly Resolution No. 1884 (see chapter 6) which led to the Declaration for the Legal Principles for the Use of Outer Space which renounced the stationing of mass destruction in space, these two potential X-20 roles disappeared. While its third specific possible mission, reconnaissance, was still viable in the USAF's opinion, the NRO already had operational robotic reconnaissance satellites providing valuable intelligence data to national policy makers. Once reconnaissance was the only remaining Dynasoar justification, this placed it "... in direct conflict with the NRO and its highly classified 'black' reconnaissance satellites and their follow-on programs."¹²² The Dynasoar's fate was almost certainly sealed by late October.¹²³

¹²⁰ Oral history interview with Robert C. Seamans, Jr., July 5, 1996, by the author. Colonel Walter L. Moore, who served as the Systems Program Office Director for the X-20, the AF's top Dynasoar officer, explained that in January 1963 he attempted to brief Deputy DDR&E Rubel on exactly the topic McNamara would ask about ten months later: the capabilities of the X-20 to test military equipment and man in space. Moore recalled, "Mr. Rubel strongly recommended that this kind of information be deleted from the presentation and indicated that such talk would jeopardize the program." When McNamara in October asked for just that type of information, Moore explained, "This interest was completely reversed from any direction or indications which had been received over the preceding years from the DOD level." See Moore's Coordination Sheet, Memorandum of X-20 Presentation to Secretary of Defense McNamara 23 October 1963 and Pertinent Background, October 30, 1963, *History of the Aeronautical Systems Division, Documents*, supra, 1-2. Declassified at author's request.

¹²¹ Houchin, *Rise and Fall of Dyna-Soar*, 260.

¹²² *Ibid.*, 264.

¹²³ The best explanation of the Dynasoar's difficulties caused by the international situation late in 1963 and by the growing importance of the NRO's reconnaissance satellites is Houchin, *ibid.*, 254ff and his insightful "The Diplomatic Demise of Dyna-Soar: The Impact of International and Domestic Political Affairs on the Dyna-Soar X-20 Project, 1957-1963," *Aerospace Historian* (December 1988): 274-80, in which he states, "When the United States and the Soviet Union accepted mutual satellite overflight in 1963, Dyna-Soar became a hindrance, threatening to unbalance international stability" which meant that the Kennedy administration soon "deemed the project a diplomatic liability." (p. 279-80)

What remained was for the DDR&E to determine the exact configuration of the Gemini-based MOL that would replace the Dynasoar and coordinate this with NASA. This took most of the month of November. In addition, the turmoil surrounding the assassination of President Kennedy also probably pushed the official announcement of Dynasoar's cancellation into the second week of December. During the fall of 1963, as it became increasingly clear that Dynasoar would not survive, some within NASA tried to offer support to the beleaguered system. Most vocal was NASA's Associate Administrator for Advanced Research and Technology Raymond L. Bisplinghoff, whose portion of NASA was responsible for working with the Air Force on Dynasoar. He wrote Seamans on November 22, 1963 that NASA should still support the X-20 because of its contributions to the "technologies of aerothermodynamics and high-temperature metallic structures applicable to maneuverable hypersonic vehicle systems." He maintained that vehicles with those characteristics "will become important components of the future national space program" and so, "The X-20 flights will therefore provide vital new technological data unobtainable from ground facilities." Bisplinghoff added, "Should the X-20 program be canceled, it is our belief that the time is so critical that action should be taken at once to develop a substitute program. The question is therefore one of considering whether the X-20 program can be completed at less cost than a substitute."¹²⁴

One should note, however, that Bisplinghoff was at the fourth level of the NASA hierarchy. Above him were Associate Administrator Seamans, Deputy Administrator Dryden, and Administrator Webb. NASA's top-level leadership offered no public support of Dynasoar and in private did not lament its potential death. In his personal correspondence to Webb, Seamans noted, "We have not felt that the orbital operation capability inherent in the present X-20 configuration will significantly increase our knowledge over that already obtained from Mercury."¹²⁵ Gemini, of course, had even more capability than Mercury. When asked if NASA leaders concluded Dynasoar was not needed because NASA was developing similar capabilities in the Gemini program, Seamans replied to the author of this dissertation,

¹²⁴ Raymond L. Bisplinghoff, Memorandum to Seamans, X-20 Program, November 22, 1963, contained in *History of the Aeronautical Systems Division, Documents*, supra, 1-2. Declassified at author's request.

¹²⁵ Seamans, Memorandum to Dryden and Webb, September 11, 1963, SPI document 1456, p. 2.

"Exactly." When asked if NASA leaders had any objection to the OSD decision to cancel Dynasoar Seamans stated, "It didn't bother us. I can't remember any problem with that."¹²⁶ Finally, a memorandum from Kennedy's special assistant for national security affairs McGeorge Bundy to Kennedy preparing him for an upcoming session with Webb informed Kennedy that Webb "... is quite cool about the use of Titan III and Dinosoar [sic] and would be glad to see them both canceled."¹²⁷ One may conclude that while the elements within NASA that had been closely working with the Dynasoar and had some direct interest in its continuation did support the program, NASA's policy makers had no serious objections to its cancellation.

DDR&E Brown laid out his conclusions concerning the Dynasoar/Gemini/MOL programs on November 14, 1963. In one sense, it represented significant movement toward the Air Force's position that not everything the military needed to learn concerning military requirements in space could be learned by using NASA-developed systems or conducting "piggyback" experiments on NASA flights. Brown explained, "Although the NASA research and development will have broad applications toward any type of space program, it is not sufficiently attuned toward the needs of military missions to be commensurate with the cost which might be identified within the national budget as providing military support. There is a growing recognition that from the standpoint of economy as well as for other reasons, a directed military program would be preferable . . . for the assessment and measurement of the utility of man as a component in an operating military system." Brown added that in his analysis, "Principal attention was directed toward the tasks of surveillance, detection, and inspection," highlighting once again the central role of reconnaissance in the military space decision making process.¹²⁸

Brown then presented McNamara with a detailed analysis of six possible configurations for a DoD space station. He defined a space station as an earth orbital platform which was designed for a rela-

¹²⁶ Oral history interview with Seamans, July 5, 1996, with the author.

¹²⁷ McGeorge Bundy, Memorandum to Kennedy, Your 11 a.m. appointment with Jim Webb, September 18, 1963, SPI document 975, p. 2.

¹²⁸ Harold Brown, Memorandum for the Secretary of Defense, Approaches to a Manned Military Space Program, November 14, 1963, contained in *History of the Aeronautical Systems Division, Documents*, supra, 1-2. Declassified at author's request.

tively long orbital life, could be resupplied by other spacecraft, could have personnel ferried to and from it, and could maintain a comfortable pressurized internal environment in which the officers could move around without wearing space suits. Such a station “. . . will be in the nature of a military laboratory with adequate arrangements for military equipment and with provision for the crew to perform reasonable duplication of military missions in space.” As with all OSD programs under PPBS/systems analysis, “The cheapest and most direct routes to this end will be considered. Extensive use will be made of other developments, principally those from the GEMINI and APOLLO programs.”¹²⁹ Of the six alternatives he supplied for DoD space stations, Brown preferred two possibilities. One was a four-room, four-person, 2,140 cubic foot station launched on a Titan IIIC with docking and storage capability, a living room, sleeping room, and laboratory. The Gemini capsule would serve as a ferry vehicle and crews would be rotated every 30 days with resupply arriving every 120. Brown’s other preferred alternative was to use NASA’s Apollo’s command and service modules converted into a 3-person station with 3,400 cubic feet that would be launched on a Saturn IB and have capabilities at least equivalent to, if not in excess of, the previous configuration. Brown said this Apollo-Saturn alternative was the most useful but also the most expensive.¹³⁰

In another sense, however, Brown’s November 14, 1963 memo was mired in the past because it continued to maintain that as DoD built its space station, “good management would call for the transfer of GEMINI to the DOD” around September 1965. Given the OSD’s experience with the proposed transfer of Gemini just one year earlier, it should have been clear that such a transfer was politically impossible. Be that as it may, the fundamental assumption in Brown’s memo was that Dynasoar should be canceled: “Cancellation of the X-20 program and pooling of presently planned national funds related to manned earth-orbit programs would provide more than enough money in FY 1965. . . . A choice of this kind would provide the Air Force with a series of manned earth-orbital launches beginning 9 months earlier than it could expect from the X-20 program.” Brown’s summary recommendation to McNamara was, “That a military space station program be initiated, taking advantage of the GEMINI developments, based

¹²⁹ Ibid., 2-3.

¹³⁰ Ibid., 6-9.

upon a package plan which cancels the X-20 program and assigns responsibility for GEMINI and the new space station program to the Air Force, the effective date for transfer of management responsibility for Gemini being October 1, 1965. . . . Something like the recommended program represents . . . the best way out of the NASA/DOD man-in-orbit problem."¹³¹

It should come as no surprise that NASA was not thrilled to learn that: a) the DoD was again recommending that Gemini should be transferred from NASA to the DoD; and b) the DoD was proposing that America's first space station be developed and managed under firm DoD control. Between this memo and a revised proposal Brown submitted on November 30, there were two weeks of NASA-DoD negotiation from which no documentation apparently survives (except the resulting Brown November 30 memo) and which one Air Force contemporary source described as "not fully known to persons other than the principals."¹³²

In his November 30 memo to McNamara Brown does mention that since his previous memo NASA had offered "somewhat in the form of a counter-proposal" a request for the DoD to examine a "manned military program which would not extend quite as far as the establishment of a space station." NASA had suggested the DoD ". . . develop a system consisting of the Gemini personnel carrier weighing 7,000 pounds attached to a pressurized and habitable military test module weighing approximately 15,000 pounds, the combination to be injected into orbit by a TITAN IIIC."¹³³ This was MOL in a nutshell. NASA supplied its basic configuration and proposed its creation as an alternative to the DDR&E's full-blown space station proposals earlier that month, not the OSD. The Air Force was relegated to the role of a passive observer to the policy making process. Brown relayed that DDR&E personnel's discussions

¹³¹ Ibid., 11.

¹³² A Lieutenant Colonel Scoville, apparently assigned to the AFSC office within NASA Headquarters. Chronological Listing and Highlight Summary of Events Leading to MOL Program, dated only December 1963, contained in *History of Aeronautical Systems Division, Documents*, supra, 2. Declassified at author's request.

¹³³ Harold Brown, Memorandum for the Secretary of Defense. Evaluation of an Orbital Military Test Module. November 30, 1963, contained in *History of Aeronautical Systems Division, Documents*, supra, 1. Declassified at author's request.

with the NASA staff “. . . have caused us to think it likely that they will advise Mr. Webb to agree, in principle, to a manned military space program which is separate from, but coordinated with, the NASA activity. They may not be prepared at this time, however, to agree to the assignment to the DOD of the responsibility for a space station.”¹³⁴

The crucial hair-splitting distinction was that, by mutual agreement, MOL was not to be considered a space station, but rather a military orbital test platform. The Webb-McNamara agreement on space stations signed in August and September respectively stated it applied to spacecraft capable of prolonged spaceflight and larger and more sophisticated than Gemini and Apollo; both NASA and DoD could argue that MOL's projected 30-day occupancy was not prolonged, nor was its overall configuration larger or more sophisticated than Gemini or Apollo. Brown reported that NASA leaders “. . . have suggested that the DOD could fulfill its needs for an orbiting military laboratory by a system which does not involve the complications of personnel ferry, docking, and resupply.” Brown said that the design he was submitting to McNamara “. . . conforms to the NASA suggestion but which, at the same time, would continue as a design objective the preservation of an internal compatibility allowing it to be convertible with only minor additional development into a useful military space station.”¹³⁵ Thus while the OSD might agree with NASA that for purposes of strict definition and public relations the MOL was not technically a space station, the OSD was also preserving the fundamental design characteristics that would enable the MOL to be relatively easily convertible into a fully functional space station.

The specifics of the MOL which Brown suggested involved the use of the Titan IIIC booster and the Gemini capsule modified so that it could join with and attach to a cylindrical, partially pressurized military test module of about 1,500 cubic feet. Two-four men would work and live there for 30 days. The laboratory modules would be equipped with “complete docking equipment” at both ends as well as a rudimentary propulsion system “so that two modules could be joined together” to form a space station of 3,000 cubic feet for up to eight people. Therefore, “Through a logical progression of development, a space

¹³⁴ Ibid.

¹³⁵ Ibid., 1-2.

station of any desired proportions could be achieved." One negative to adopting NASA's suggestion for a DoD MOL was that it would "... have the effect of imposing a delay in arriving at a decision on the assignment of management responsibility for a space station, since their proposal [for the MOL] would not be defined as a station." All in all, however, Brown concluded, "The program described in this paper is acceptable as a near-term manned military space program. It is inferior, however, to my previous recommendation and should be agreed to only as a fall-back position."¹³⁶ An incisive BoB analysis of the MOL proposal pointed out that the incorporation of future rendezvous and resupply features into the MOL "... would result in a situation in which a space station project would most logically be an outgrowth of the present MOL project. This would be a difficult situation for NASA to accept."¹³⁷ Still, the president's unclassified annual space report stated, "Rendezvous provisions will be designed into the MOL so that the laboratory could later be resupplied and reused if justified by progress made in defining man's military role in space."¹³⁸

Nevertheless, McNamara quickly adopted Brown's supposed "fall-back" position as the OSD preferred alternative and in ten days announced the cancellation of Dynasoar and the beginning of the official study phase of MOL. Before the December 10 announcement, the Air Force generated a flurry of memoranda to support the Dynasoar's existence, but to no avail. Near the end, the Air Force was proposing the Dynasoar be used as the ferry vehicle for any proposed space station, but it seemed extremely unlikely that the OSD would authorize a billion dollars for the vehicle for that purpose.¹³⁹ At the December

¹³⁶ Ibid., 2-4, 8.

¹³⁷ Willis Shapley, BoB Military Division, Memorandum to BoB Director, December 6, 1963, file: Space Projects - MOL, Space Stations, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

¹³⁸ Executive Office of the President, *U.S. Aeronautics and Space Activities, 1963*, Report to the Congress from the President of the United States, January 27, 1964, NSA MUS document 329, p. 41.

¹³⁹ See Alexander Flax, Assistant Secretary of the Air Force for R&D, Memorandum for the Secretary of the Air Force, Manned Military Space Program, December 4, 1963, contained in *History of the Aeronautical Systems Division, Documents*, 1. Declassified at author's request. Another memo representative of the AF's final attempts to save the X-20 was Major General J.K. Hester, Assistant Vice Chief of Staff of the Air Force, Memorandum to the CSAF, Approaches to a Manned Military Space Program, in which Hester said if some element of the space program had to be curtailed then "... the cancellation of the GEMINI program should be considered since such action would result in considerable savings to the Nation which could be supplied toward other manned space flight efforts." Ibid., 9.

10 news briefing McNamara explained OSD's calculations showed canceling Dynasoar and substituting MOL would save \$100 million over the next eighteen months: he maintained Dynasoar had cost \$400 million so far, "but there are hundreds of millions left to be spent to achieve a very narrow objective." He elaborated that while the Dynasoar would have explored precise controlled re-entry techniques, "It was not intended to develop a capability for ferrying vehicles or personnel or equipment into orbit, nor was it intended that the Dynasoar would provide a capability for extended stay in orbit, nor was it intended that it would provide a capability for placing substantial payloads, useful payloads, in orbit, and hence, it had a very limited objective. It was very expensive."¹⁴⁰ Later he stated, "I think this is a good illustration of what happens when we start on a program with a poor definition of our end objective."¹⁴¹

When explaining the Dynasoar cancellation to the Congress the next month, McNamara said, "The X-20 was not contemplated as a weapon system or even as a prototype of a weapon system. Its distinguishing feature, as compared with MERCURY and GEMINI, was to be its substantial lifting maneuver capability. . . . Yet, from the military point of view, the determination of man's ability to perform useful military missions in space is the more immediate problem, and for this purpose DYNASOAR was so limited as to make it a very poor choice. The maneuverability feature of DYNASOAR, while of great interest, is not needed now. . . ."¹⁴² McNamara did not mention that it was he who had ordered the Air Force just two years earlier to stop studying the military applications of the Dynasoar and focus solely on its research potential. He also did not mention that it was he who just three months earlier had harshly criticized the Air Force for lacking the kind of information that would have resulted from the studies he pro-

¹⁴⁰ McNamara, Transcript of News Briefing, December 10, 1963, folder: Dyna-Soar, DoD sub-series, Federal Agencies series, NHDRC, 1-2. It should be noted that in addition to canceling Dynasoar and starting MOL, McNamara also announced a program called ASSET (Aerothermodynamic Structural Systems Environmental Test) designed to use unmanned glide-type smaller vehicles launched on USAF Thor IRBMs to explore some of the same questions concerning the hypersonic flight regime which Dynasoar was supposed to have investigated.

¹⁴¹ Cited in Futrell, *Volume II*, 225.

¹⁴² McNamara, Statement before the House Armed Services Committee on the 1965 Defense Budget, January 27, 1964, folder: Unclassified Statements, FY65, box 32, RG 200, Robert McNamara papers, NARA, 105.

hibited it from making nor that it was he who nevertheless used this lack of information as a justification for canceling the program.

McNamara also on December 10 attempted to make clear his thinking about MOL: "I have said many times in the past that the potential requirements for manned operations in space for military purposes are not clear. But that, despite the fact that they are not clear, we will undertake a carefully controlled and carefully scheduled program of developing the techniques which would be required were we to ever suddenly be confronted with a military mission in space."¹⁴³ MOL was presented, at least for public consumption, as primarily a test bed to experiment with the functions of and evaluate the effectiveness of the military man in space. McNamara said MOL was not created to perform a "... precise, clearly defined, well recognized military mission, but because we feel that we must develop certain of the technology that would be the foundation for manned military operations in space should the specific need for those ever become clear and apparent."¹⁴⁴ The press release distributed after McNamara's briefing described the MOL as "approximately the size of a small house trailer" which would "increase the Defense Department effort to determine the military usefulness of man in space." Its design would enable the two astronauts to move about freely without a space suit for up to a month. The first of six planned manned launches was expected in late 1967 or early 1968.¹⁴⁵

The basic operational concept of the MOL was that the two astronauts would be positioned in the modified Gemini capsule which was itself attached to the laboratory module. This entire unit was placed on top of what would come to be called the Titan IIIM and launched into orbit. Then, the astronauts would open the hatch between the Gemini capsule and the laboratory, enter the laboratory and seal up the now inactive Gemini capsule. For the next thirty days they would perform the mandated experiments and observations. Then, they would reposition themselves into the Gemini capsule, separate from the labora-

¹⁴³ McNamara, Transcript of News Briefing, December 10, 1963, p. 6.

¹⁴⁴ Ibid.

¹⁴⁵ DoD, Press Release No. 1556-63, December 10, 1963, folder: Dyna-Soar, DoD subseries, Federal Agencies series, NHDRC, 1.

tory module, and reenter the earth's atmosphere and land in the ocean just like a standard Gemini reentry. Eventually, the laboratory module's orbit would decay and it would burn up upon reentering the atmosphere. While McNamara's remarks cited above indicated a continuing skepticism about the role of military officers in space, his backing of the MOL was of some consolation to the Air Force in the context of losing Dynasoar: "Significantly, this was a departure from earlier Defense pronouncements that the military had no clearly defined mission for men in space. Now at least Secretary McNamara showed himself willing to investigate the subject seriously."¹⁴⁶

Other documents cited above make clear that what OSD had in mind was experimenting specifically with what role humans could play in gathering intelligence data via space-based reconnaissance. The DDR&E alluded to this when it described MOL to the USAF and tasked the AFSC's Space System Division with responsibility for developing it, explaining that the MOL's goal was for "... employing man in his most useful functions of discrimination, quality improvement and quick reaction through his ability to recognize information and transmit it back to the ground."¹⁴⁷ The core of MOL's mission was clear to perceptive analysts. The *New York Times* stated two days after McNamara's announcement, "The primary purpose of the Air Force's newly authorized orbiting laboratory will be to determine the effectiveness of manned space stations for photographic reconnaissance of the earth."¹⁴⁸ When asked about MOL's central mission, Seamans told this author, "Obviously that was going to be largely reconnaissance."¹⁴⁹

NASA's Attitude Concerning MOL

Webb supported the MOL decision in public, stating, "The decisions announced by Secretary McNamara today . . . follow discussion with NASA and were fully coordinated with the programs of this

¹⁴⁶ *Government Operations in Space*, 9.

¹⁴⁷ Office of the DDR&E, Memorandum for the Assistant Secretary of the Air Force for R&D, Manned Orbital Program, December 11, 1963, attachment 1, SPI document 1655, p. 2.

¹⁴⁸ John Finney, "Space Stations to be Tested for Reconnaissance and Command-Post Roles," *New York Times*, December 12, 1963.

¹⁴⁹ Oral history interview, July 5, 1996, by the author. Seamans was intimately familiar with the MOL program because as Nixon's Secretary of the Air Force he defended it and its capabilities before and during the process whereby Nixon canceled it in June 1969.

agency. . . . The decisions announced by Secretary McNamara are based on the best use of resources to maximize our national capability in space and NASA fully supports them."¹⁵⁰ Privately, he was more concerned, especially over the fact that the media were pressing "for some statement as to why the terms of the agreement announced on October 17 to coordinate our approaches to a possible new program for manned orbital operations were not followed." Webb explained to Seamans

Some newsmen are taking the view that all this was bypassed and in a sense, I was forced by McNamara to go forward faster than this agreement calls for. My own view of what has happened is that in connection with our joint review of both the 1964 and 1965 budgets, it became clear that Dyna Soar could not hold up in the competition for funds and we have made an interim arrangement to use the Titan III booster and the Gemini spacecraft to accomplish a number of things the military need to do on an experimental basis.

Webb then tasked Seamans with developing a NASA position paper detailing NASA's exact role in the development of MOL.¹⁵¹

The resulting internal NASA document from Seamans made the following points that would in fact represent both NASA's and the DoD's long-term "party line" position on MOL. It served as a guide for the next six years concerning public releases, congressional testimony, and speeches by leaders of both NASA and the DoD. It is therefore quite important because it represents virtually everything stated or written about MOL in the public record and in unclassified documents from 1963-1969:¹⁵²

- MOL is a single project with a specific goal within the overall U.S. space effort, not a broad space station program.
- MOL is being implemented in response to military requirements established solely by the DoD.
- NASA's technology, hardware, facilities, and operational know-how "will be made available to the DOD, and the DOD will take full advantage of these national assets. NASA will, in turn, take full advantage of the research and development opportunities presented by the MOL."

¹⁵⁰ Webb, as cited in DoD, Press Release No. 1556-63, December 10, 1963, *supra*.

¹⁵¹ Webb, Memorandum to Seamans, December 13, 1963, folder: December 1963, box 35, James Webb papers, Harry S. Truman Library (HSTL), 1.

¹⁵² Seamans, Memorandum for Record, The NASA Position on the DOD Manned Orbiting Laboratory Project, December 19, 1963, folder: DOD-NASA Coordination, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA, 1. Only the portions of this indented section within quotation marks are direct citations; the entire section has been indented and uses bullet statements for purposes of organization and clarity and because that is the general format of the original document.

- MOL "should not be construed as the national space station" and does not fall under the Webb/McNamara agreement on manned orbital research and development systems larger than Gemini and Apollo signed earlier that fall. "The MOL is, rather, a specific experimental test bed utilizing NASA's Gemini project and the Titan III for certain potential military space applications not within the scope of NASA's activities. NASA projects will be considered for test in the MOL on a non-interference basis."

- MOL was coordinated between the two agencies and concurred in by NASA. The DoD originally indicated its requirements for testing military equipment in space [Brown's November 14 memo] and then a system concept was evolved by NASA and DOD during the coordination phase [prior to Brown's November 30 memo] "and accepted in lieu of the original DOD concept for meeting these requirements."

- "NASA and DOD worked together in defining this project in the spirit of the Gemini agreement."

- "The DOD MOL, as a special-purpose experimental military project, does not conflict with the NASA unmanned and manned flight projects, and does not affect the high priority of the Nation's major close-range space goal of landing a man on the moon before the end of the decade."

- The timing of the MOL and Dynasoar decisions "were dictated by the urgency of the budget." Major savings will result from the cancellation of Dynasoar.

This comprised the majority of information anyone but the most senior policy making officials and Air Force personnel working on MOL had access to concerning MOL between its commencement in December 1963 and its cancellation in June 1969.

An Addendum: Reconnaissance Satellites and Space Policy in the Kennedy Administration

Within days of its beginning, the Kennedy administration tightened and extended Eisenhower's policies on releasing information concerning reconnaissance satellites in particular and military space launches in general. An OSD official explained to Kennedy that the information the DoD planned to release to the media on upcoming SAMOS launches "... represents a severe reduction from what had previously been issued. Eliminated entirely from former procedures are four pages comprising 22 questions and answers. Press briefings before and after launching have been eliminated." This Assistant Secretary of Defense for Public Affairs stated "Dr. Charyk has reviewed these changes and is satisfied that they meet all his security requirements and those of his SAMOS Project Director."¹⁵³ Joseph Charyk was Undersecretary of the Air Force in the late Eisenhower and early Kennedy administrations. Traditionally, the in-

¹⁵³ Arthur Sylvester, Office of the Assistant Secretary of Defense for Public Affairs, Memorandum for Kennedy, January 26, 1961, NSA MUS document 639, p. 1.

dividually occupying this position has served as the NRO Director. The Assistant Secretary summarized for the President, "This readjustment is a big step toward the gradual reduction of volunteering information on our intelligence acquisition systems which Mr. McNamara informed me is your desire."¹⁵⁴ Clearly Kennedy offered no objections to the new policy, given the fact he apparently initiated it through McNamara.

After a year, the Kennedy administration in general and the OSD in particular concluded their new policy of withholding information on reconnaissance satellites was the proper policy and not only made it official but broadened it to include all military space launches. The OSD issued a classified directive, S-5200.13, Security and Public Information Policy for Military Space Programs, in March 1962 which stated,

Adequate protection of military space programs is vital to the security of the United States. This requires the capability to launch, control, and recover space vehicles without public knowledge of the timing of these actions or of the specific missions involved. It is impractical to selectively protect certain military space programs while continuing an open policy for others since to do so would emphasize sensitive projects.

Therefore in the future *all* military space projects, vehicles, and launches would be identified only "by means of numerical or alphabetical designators selected and assigned at random;" no nicknames could be used. All public information releases had to be cleared through the OSD public affairs office. All reports, plans, and other documents relating to all military space programs "will be severely limited and controlled." The number of people with access to information concerning military space programs was to be reduced.¹⁵⁵ In other words, the few people privy to information concerning the military space program could say or write virtually nothing about it. No United States official would even formally admit the United States operated reconnaissance satellites until President Jimmy Carter did so in 1978.

Apparently the Kennedy administration's increasing the security surrounding reconnaissance satellites was an attempt to avoid provoking the USSR into threatening American reconnaissance satel-

¹⁵⁴ Ibid.

¹⁵⁵ DoD Directive S-5200.13, Security Policy for Military Space Programs, March 23, 1962, folder: Defense 1962, box 17, RG 220, Records of the National Aeronautics and Space Council. NARA, 1-3.

lites. Indeed, throughout 1961 and 1962 the Soviets waged a sort of diplomatic offensive in the UN and elsewhere against reconnaissance satellites. The United States denied satellite reconnaissance was espionage but the Soviet campaign stopped only in the latter half of 1963 as the USSR perfected and began employing its own reconnaissance satellites.¹⁵⁶ America and the Soviet Union signed no accord concerning the legality of satellite reconnaissance; there simply emerged an unstated understanding that both countries conducted and accepted the practice.

The Kennedy administration's official policy concerning satellite reconnaissance that emerged in 1962 has recently been declassified. Kennedy signed NSAM 156 (no title) on May 26, 1962. In it he explained, "We are now engaged in several international negotiations on disarmament and peaceful uses of outer space. . . . They raise the problem of what constitutes legitimate use of outer space, and in particular the question of satellite reconnaissance. In view of the great national security importance of our satellite reconnaissance programs, I think it desirable that we carefully review these negotiations with a view to formulating a position which avoids the dangers of restricting ourselves, compromising highly classified programs, or providing assistance of significant military value to the Soviet Union and which at the same time permits us to continue to work for disarmament and international cooperation in space."¹⁵⁷

One peek inside the resulting NSAM 156 Committee that was formed under U. Alexis Johnson, Deputy Undersecretary of State for Political Affairs, was provided by its Executive Secretary, Raymond Garthoff, in an article. Garthoff stated the fundamental purpose of the Committee was to review the political aspects of United States policy on satellite reconnaissance. The very existence of the Committee, any reference to its function, and all of its work was considered Top Secret.¹⁵⁸ In addition Garthoff re-

¹⁵⁶ The particulars of the administration's justification for tightening the policy of secrecy surrounding reconnaissance satellites as well as the USSR's campaign against them (and its cessation) are not germane to this dissertation. For full details see: William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Berkley Books, 1986), 105ff.; Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-1984* (Ithaca, NY: Cornell University Press, 1985), 66ff.; Gerald M. Steinberg, *Satellite Reconnaissance: The Role of Informal Bargaining* (New York: Praeger Publishers, 1983), 44ff.; Philip J. Klass, *Secret Sentries in Space* (New York: Random House, 1971), 126ff; and Richelson, *Secret Eyes*, 75ff.

¹⁵⁷ NSAM 156, no title, May 26, 1962, folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA, p. 1. Declassification date: December 31, 1996.

lated that after the Committee submitted its report on July 2, the NSC met on July 10, 1962 to discuss the Committee's report; after the meeting Kennedy supported all of its 19 recommendations except an arms control measure. Garthoff does not, however, provide specific information concerning the nature of the 19 recommendations.¹⁵⁹ A military assistant to the Secretary of the Air Force specializing in space explained that the NSC's passage and Kennedy's approval of the basics of the NSAM 156 Committee's report was translated into NSC 2454, which contained 18 points that formed "... a firm foundation to space policy in this Government under President Kennedy's personal aegis. We all knew where we stood in space, what we would say at the United Nations, what we would say to the outside world, and what was absolutely not negotiable."¹⁶⁰

The recently declassified NSAM 156 Committee's report opened by stating, "The reconnaissance satellite program is extremely important to Free World security, and will continue to be necessary to provide crucial information about Soviet activities, capabilities, and targets."¹⁶¹ After an extensive discussion of the international complexities of conducting a satellite reconnaissance program given the then current Soviet diplomatic offensive against reconnaissance satellites, the report offered 19 recommendations. The recommendations directly relevant to reconnaissance satellites said the United States should: maintain that international law applies to outer space in the same sense as it does to the high seas and therefore states are free to pursue defensive military pursuits in space; avoid declaring or implying that reconnaissance satellites are anything but a peaceful use of space; seek to gain acceptance of the principle of the

¹⁵⁸ Raymond L. Garthoff, "Banning the Bomb in Outer Space," *International Security* 5 (1980/81): 26.

¹⁵⁹ *Ibid.*, 27-28.

¹⁶⁰ Colonel Paul E. Worthman, who was present for, and made significant contributions to, an oral history interview with Secretary of the Air Force Eugene Zuckert, July 25, 1964, in *The John F. Kennedy Presidential Oral History Collection, Part I: The White House and Executive Departments*, micro-filmed from the holdings of the John F. Kennedy Library (Frederick, MD: University Publications of America, 1988), reel 12, p. 20-21.

¹⁶¹ U. Alexis Johnson, Representative of the Department of State, and concurred to by representatives of the DoD, CIA, ACDA, NRO, NASA and OST. Report of the NSAM 156 Committee, July 2, 1962, folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA, p. 1. Declassification date: December 31, 1996.

legitimacy of space reconnaissance, even when confronted by specific Soviet pressure to outlaw satellite reconnaissance; conduct an R&D program into a completely clandestine reconnaissance satellite program in case circumstances should ever make it necessary; continue to refuse to "publicly disclose the status, extent, effectiveness or operational characteristics of its reconnaissance program;" "discreetly disclose to certain allies and neutrals selected information with regard to the US space reconnaissance program" with the goal of "impressing upon them its importance for the security of the Free World;" "in private disclosures emphasize the fact of our determination and ability to pursue such programs because of their great importance to our common security, despite any efforts to dissuade us;" and continue to study the role of space reconnaissance in disarmament inspection.¹⁶²

The above recommendations were all unanimously agreed upon by NSAM 156 Committee members. It seems likely that they were included in NSC 2454 which was designed to take the report's recommendations and state them as official governmental policy. One document from August 1962 made clear the impact of the NSAM 156 Committee on Kennedy. In it the White House staff explained that Kennedy wanted American space policy to "be forcefully explained and defended" at forthcoming UN meetings, with an emphasis on three points. First, "To show that the distinction between peaceful and aggressive uses of outer space is not the same as the distinction between military and civilian uses, and that the U.S. aims to keep space free from aggressive use and offers cooperation in its peaceful exploitation for scientific and technological purposes." Second, "To build and sustain support for the legality and propriety of the use of space for reconnaissance." Finally, "To demonstrate the precautionary character of the U.S. military program in space."¹⁶³ Clearly the NSAM 156 Committee's recommendations had been accepted by Kennedy and served as the core of his "marching orders" to the American diplomats at the UN. The NSAM 156 Committee's recommendations were the only official, written space policy document to emerge from the Kennedy administration.

¹⁶² Ibid., 7-9.

¹⁶³ NSAM 183, Explanation and Defense of US Space Program, August 27, 1962, signed by McGeorge Bundy, folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA, 1. Declassification date: December 31, 1996.

Finally, it is necessary to state that the NRO continued to serve as a kind of management overlay under which the USAF and the CIA continued to exhibit some degree of conflict in their administration of the nation's satellite reconnaissance program. Albert Wheelon was a participant in the Kennedy-era NRO. He became the CIA's first Deputy Director for Science and Technology in 1963. In this capacity he was the chief architect of the CIA's space efforts and oversaw the CORONA program during his tenure. He reported that McNamara believed that the CIA's role in the NRO should be confined to defining requirements, doing some advanced research and examining the film from the reconnaissance satellites. When Brockway McMillan became Undersecretary of the Air Force and therefore NRO Director, he tried to implement McNamara's desires by notifying the CIA he was transferring the CIA's responsibilities for CORONA to the Air Force. For a year Director of Central Intelligence John McCone remained undecided as to how to respond to the DoD drive for sole control of the NRO. However, Wheelon finally convinced McCone that the CIA should continue to play a strong role in the NRO: "After a period of readjustment in the expectations of the Defense Department, the partnership between CIA and the Air Force on CORONA resumed and served the country well to the end of the program in 1972." However, Wheelon stated, "The debate between CIA and DOD then shifted in 1963 to whether CIA ought to pursue new reconnaissance systems." OSD officials such as Assistant Secretary of Defense Eugene Fubini and McMillan "... argued against each system that CIA was developing." This debate continued until 1965 when Alexander Flax became the NRO's Director in 1965; Flax "... saw the CIA and the Air Force as valuable and complementary assets." Wheelon reported the OSD/AF-CIA difficulties within the NRO faded from that point forward.¹⁶⁴

Secondary accounts of this period of intra-NRO difficulties during the Kennedy administration, some based on interviews with the principals, seem to buttress Wheelon's account and even indicate the situation was quite heated. William Burrows concluded that McMillan was actually "... determined to break the agency's [CIA's] hold on the design and procurement of reconnaissance systems through the NRO and, apparently, to wrest management of strategic reconnaissance away from the CIA in the proc-

¹⁶⁴ Albert D. Wheelon, "Lifting the veil on CORONA." *Space Policy* 11 (November 1995): 252-53.

ess." This resulted in a collision course that "... soon developed into a series of battles over turf that were so vituperative that they are still talked about by old hands. . . ." ¹⁶⁵ Richelson also concluded, "McMillan wanted to seize control of the reconnaissance program for the Air Force. As Director of NRO he believed that he should be in full control of the satellite reconnaissance program and that the CIA should take orders from him, not be an equal partner." Richelson says the situation was calmed only with the creation in 1965 by McNamara and McCone of a National Reconnaissance Executive Committee (NREC) to oversee the NRO's budget, structure, and R&D activities. ¹⁶⁶

Finally, the one and only product so far produced by the NRO's new history office confirms the tensions that existed in the early 1960s. Its report (the research for which did survey applicable primary sources) stated that during the Kennedy administration, "the Air Force now moved to secure control over the entire reconnaissance effort." McMillan "... recommended that the entire photosatellite program be turned over to the Air Force in order to streamline the command and achieve greater success. For McMillan, the NRO was primarily an Air Force activity and the CIA was irrational and obstructionist. . . . The rivalry between the Air Force and the CIA intensified." In this battle McNamara "... often sided with McCone against the Air Force in order to maintain his position as arbiter of DOD planning and resource allocations." The NRO account confirms that the situation finally got so bad that McCone and new Deputy Secretary of Defense Cyrus Vance formed the NREC to make funding and other decisions for the NRO. Finally by 1965 the efforts of a three-person Executive Committee consisting of the Director of Central Intelligence, the Assistant Secretary of Defense, and the President's Science Adviser were able to establish the NRO as a separate agency within the DOD and designate the Secretary of Defense as its primary executive agent. The new decision-making structure "worked well." ¹⁶⁷

¹⁶⁵ Burrows, *Deep Black*, 199-200.

¹⁶⁶ Richelson, *Secret Eyes*, 82.

¹⁶⁷ Gerald Haines, "The National Reconnaissance Office (NRO): Its Origins, Creation, and Early Years," in the forthcoming *Eye in the Sky* (Washington, DC: Smithsonian Institution Press), 25-30 in manuscript copy.

In this chapter the intricate relationship between the specific programmatic efforts of NASA and the DoD has been examined. Neither the DoD's Dynasoar nor its MOL can be analyzed in isolation from NASA's Gemini. Under the imperatives of McNamara's systems analysis, the Air Force's human spaceflight effort had to mesh with NASA's R&D and it had to promise distinct and quantifiable advantages to national security. While these criteria doomed Dynasoar by December of 1963 they were flexible enough to permit McNamara to authorize the creation of a program which had as its avowed purpose the experimental evaluation and assessment of exactly what military officers could accomplish in space. The primary category of investigation would be the role humans could and should play in the gathering of reconnaissance information. During the Johnson administration the delicate interplay between NASA and DoD's human spaceflight efforts would not cease. If anything, the concerns over possible NASA-DoD duplication in this area became even more pronounced as NASA's budgets actually began to decline as a result of the financial demands of the Vietnam war and Johnson's Great Society programs. While MOL did manage to survive Johnson's tenure, it would be canceled within six months after his departure. NASA's follow-on to the Apollo program appeared to be in little better shape during this era of financial pressure. The goal of the next chapter will be to set the overall political and space policy context as well as the NASA-DoD institutional stage for the human spaceflight projects during the Johnson administration.

9. Johnson's Philosophy, Space Policy, and Institutional Continuity

In a sense, the anxiety raised by Sputnik did not end until Neil Armstrong and Buzz Aldrin took their historic steps in July 1969.¹

It's unfortunate, but the way the American people are, now that they have developed all this [space] capability, instead of taking advantage of it, they'll probably just piss it all away.²

While Lyndon Johnson had remained committed to completing the Apollo program, the twin crises of the conflict in Southeast Asia and urban unrest in the United States had not allowed him to allocate resources to any major post-Apollo space objectives. As the first lunar landing approached, the space program was clearly at a crossroads.³

Very frankly, I think I spent more time in the space field in '57 and '58 and '59 and '60, and up to '63, than I did after I became President. . . . I left the administration of most of these matters to them [Webb, Dryden, Seamans]. . . . I gave them the greatest amount of freedom possible. And they exercised it with good judgment.⁴

Whether we stand first in these endeavors [space] matters to our momentary pride but not to our continuing and permanent purpose. The race in which we of this generation are determined to be first is the race for peace in the world. . . . I have said it before. I want to say it again. The world has no need for arms races or for moon races.⁵

This chapter will endeavor to cover topics in the Johnson administration which, for Eisenhower and Kennedy, required separate chapters: exploration of the president's attitudes concerning the cold war

¹ Robert A. Divine, *The Sputnik Challenge* (New York and Oxford: Oxford University Press, 1993), vii.

² Lyndon Johnson, cited in Walter Cunningham, *The All-American Boys* (New York: MacMillan Publishing Company, 1977), 62.

³ John M. Logsdon, with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), editorial introduction to document III-20, p. 495.

⁴ Oral history interview of Lyndon Johnson by Walter Cronkite, July 5, 1969, folder: LBJ Interviews, box: White House, Presidents, Johnson, Pre-White House - White House Interests, NHDRC, 30.

⁵ Lyndon Johnson, June 11, 1965, Remarks at the NASA Manned Spacecraft Center, and June 17, 1965, Remarks Honoring the Gemini 4 Astronauts. *Public Papers of the President, 1965* (Washington, DC: USGPO, 1966), 656.

and their impact on space policy as well as the race for prestige in space: and the institutional relationship between NASA and the DoD as expressed by the interacting components of support, coordination, and rivalry. The current author has concluded there is adequate continuity in these assorted topics from the Kennedy into the Johnson administration so that one chapter should suffice.

Johnson, the Cold War, and Détente

During Johnson's term there was additional movement away from directly confronting the Soviet Union and a continued lessening of inflammatory Cold War rhetoric that had seen its initial momentum during the Kennedy administration. However, this budding détente was not enough to cause Lyndon Johnson to curtail the drive to ensure America was first to land on the moon. Nor was it enough to bring about a close rapprochement between the two countries, given the continuing presence of mitigating factors such as America's involvement in Southeast Asia and the Soviet invasion of Czechoslovakia in 1968. Therefore, while there was enough of a lessening of cold war tensions during the Johnson era so that he did not feel impelled to extent the space race beyond Project Apollo, the détente was not pervasive enough to endanger Apollo's funding or momentum.

Continued Quest for Peace Within Containment

Throughout Johnson's five years of office, he regularly spoke words of reconciliation. In his first month as president he said, "One of my first concerns has been to make it clear to the Soviet Union, and to Mr. Khrushchev personally, that the United States will go its part of the way in every effort to make peace more secure." Of course he also added, "On strength and the need for fully effective defenses I yield to no one. . . . We have to live on the same planet with the Soviet Union, but we do not have to accept Communist subversion. . . ."⁶ Just as Eisenhower and Kennedy shared the trait of vigorously pursuing the containment policy while searching for verifiable disarmament measures and other means of lowering cold war tensions, so did Johnson's cold war policy incorporate these dual approaches. There are seemingly infinite examples of declarations throughout his presidency which at first seem contradictory, but upon closer reflection fit the Eisenhower-Kennedy pattern described above.

⁶ Johnson, Remarks to Employees of the Department of State, December 5, 1963, *Public Papers of the President, 1963-1964* (Washington, DC: USGPO, 1965), 28.

For example, Johnson declared on April 20, 1964, "Communists, using force and intrigue, seek to bring about a Communist-dominated world. Our convictions, our interests, our life as a nation, demand that we resolutely oppose, with all of our might, that effort to dominate the world. This, and this alone, is the cause of the cold war between us."⁷ Yet five days later he said, "We are constantly searching for any agreements that can be effected that will ease tensions and promote our national interest and promote better relations. . . . I do hope always for better relations. I am searching for them. I am doing everything I can to promote them."⁸ Johnson summarized, "Our guard is up, but our hand is out."⁹ These sentiments of containment and national defense on the one hand, coupled with a desire for lessening tensions on the other, characterized the cold war rhetoric of senior administration officials from Johnson on down. As Johnson said when he referred to the old days after Khrushchev's removal from office in late 1964, "Our relations with the Soviet Union have come a long way since shoes were banged on desks here in New York and a summit meeting collapsed in Paris."¹⁰ And yet four days later: "We must never forget that the men in the Kremlin remain dedicated, dangerous Communists."¹¹

In private Johnson revealed a certain strain resulting from balancing these two impulses, especially as they came together in Southeast Asia. He told his biographer concerning the Vietnam imbroglio,

I knew from the start that I was bound to be crucified either way I moved. If I left the woman I really loved - the Great Society - in order to get involved with that bitch of a war on the other side of the world, then I would lose everything at home. All my programs. . . . But if I left that war and let the Communists take over South Vietnam, then I would be seen as a coward and my nation would be seen as an appeaser and we would find it impossible to accomplish anything for anybody anywhere on the entire globe. . . . I knew that if we let Communist aggression succeed in taking over South Vietnam, there would follow in this country an endless national debate - a mean and destructive debate - that would shatter my Presidency, kill my administration, and damage our democracy.¹²

⁷ Johnson, Remarks on Foreign Affairs to the Associated Press, April 20, 1964, *ibid.*, 495.

⁸ Johnson, News Conference, April 25, 1964, *ibid.*, 554.

⁹ Johnson, April 20, 1964 remarks cited above, *ibid.*, 496.

¹⁰ Johnson, Remarks at the Annual Dinner of the Alfred E. Smith Memorial Foundation, October 14, 1964, *ibid.*, 1330.

¹¹ Johnson, Radio and Television Report to the American People, October 18, 1964, *ibid.*, 1377.

¹² Doris Kearns, *Lyndon Johnson and the American Dream* (New York: Harper & Row, Publishers, 1976), 251-52.

Little wonder then that a radical reorientation of American space policy was not at the top of Johnson's priorities. He was inclined to support the lunar landing goal, do what McNamara felt necessary in space for national security purposes while not authorizing any large next-generation space endeavors.

By early 1965 McNamara spoke for the administration when he explained the "gradual relaxation of the previously rigid bi-polarization of world power. . . . Long frozen positions are beginning to thaw and in the shifting currents of international affairs there will be new opportunities for us to enhance the security of the Free World and thereby our own security." He added that while America's involvement in places such as Vietnam was worrisome and difficult, "we do ourselves a grave disservice if we permit them to obscure the more fundamental and far reaching changes in our position in the world vis-à-vis the Soviet Union."¹³ The CIA also signaled the opportunities for reducing tensions in its top secret intelligence estimates: "Mutual disarmament will probably be conceptually attractive to some of the Soviet leadership as a means for reducing the economic burden of their defense establishment. . . . Any progress toward international arms limitation agreements will probably be slow. But we think that the Soviets probably will continue to seek ways to curtail the arms race in a moderate degree by mutual example."¹⁴ NSAM 352 of July 1966 was entitled "Bridge Building" and stated, "The President has instructed that . . . we actively develop areas of peaceful cooperation with the nations of Eastern Europe and the Soviet Union. . . . These actions will be designed to help create an environment in which peaceful settlement of the division of Germany and of Europe will become possible."¹⁵ By early 1967 Johnson openly declared, "Our objective is not to continue the cold war, but to end it"¹⁶ and that ". . . there is abundant evidence

¹³ McNamara, Statement before the House Armed Services Committee on the 1966 Defense Budget, February 18, 1965, folder: Unclassified Statement, 1966 Defense Budget, box 44, RG 200, Robert McNamara papers, NARA, 4-5.

¹⁴ CIA, NIE 11-4-65, Main Trends in Soviet Military Policy, April 14, 1965, reprinted in Donald P. Steury, compiler, *Estimates on Soviet Military Power: 1954 to 1984*, Center for the Study of Intelligence (Washington, DC: CIA, December 1994), 207.

¹⁵ NSC, NSAM 352, Bridge Building, July 8, 1966, NSA PD document 1147, 1.

¹⁶ Johnson, State of the Union Address, January 10, 1967, *Public Papers of the President, 1967* (Washington, DC: USGPO, 1968), 10.

that our mutual antagonism is beginning to ease."¹⁷ In June Johnson met with Soviet Premier Alexei Kossygin in Glassboro, NJ and while they reached no breakthroughs, Johnson felt comfortable enough by the end of 1967 to summarize, "We don't think that things are as tense, or as serious, or as dangerous as they were when the Berlin Wall went up, in the Cuban missile crisis, or following Mr. Kennedy's visit with Mr. Khrushchev at Vienna."¹⁸

The thaw, or at least the perception of one, between the two countries was sufficient for the Johnson administration to build upon the limited but concrete agreements Kennedy had forged with the Soviets near the end of his term such as the Limited Test Ban Treaty, the Washington-Moscow "hot line," and sales of surplus American wheat to the Soviets (see chapter 6). The tangible results from the Johnson administration included: a Civil Air Agreement resuming United States-Soviet Union air service; a Consular Convention to establish diplomatic posts throughout each country; and assorted accords on East-West trade and cultural exchanges. Johnson called the Nuclear Nonproliferation Treaty designed to halt the spread of nuclear weapons components and technology "the most important international agreement in the field of disarmament since the nuclear age began."¹⁹ Johnson expressed hope that the United States and USSR could "... enter in the nearest future into discussions on the limitation and the reduction of both offensive strategic nuclear weapons delivery systems and systems of defense and ballistic missiles."²⁰ One pact directly applicable to the space arena was an Agreement for the Rescue and Return of Astronauts and Space Objects which mandated countries render assistance to astronauts in distress as well as the return of space objects and components to the country which launched them; Johnson called it "one more link in a growing chain of international cooperation which helps protect the peace of this planet."²¹ John-

¹⁷ Johnson, Message to Congress Transmitting the Annual Report of the Arms Control and Disarmament Agency, February 17, 1967, *ibid.*, 207.

¹⁸ Johnson, News Conference, December 19, 1967, *ibid.*, 1163.

¹⁹ Johnson, Remarks Before the United Nations General Assembly Following its Endorsement of the Nuclear Nonproliferation Treaty, June 12, 1968, *Public Papers of the President, 1968-1969* (Washington, DC: USGPO, 1970), 713.

²⁰ Johnson, Remarks at the Signing of the Nuclear Nonproliferation Treaty, July 1, 1968, *ibid.*, 764. However, the Strategic Arms Limitation Treaty (SALT I) and the Anti-Ballistic Missile Treaty (ABM) would both have to wait until well into the Nixon administration.

son later summarized, "We all had a long way to go, but slowly the Cold War glacier seemed to be melting."²² Probably most important from the space historian's perspective was the Outer Space Treaty (see below).

One must maintain a sense of balance, however. After the USSR invaded Czechoslovakia in August 1968 to crush the movement toward loosening Communist party control, Johnson emphasized, "The events in Eastern Europe make it clear - and make it clear with the force of steel - that we are still a long way - a long way - from the peaceful world that we Americans all wish to see. The message out of Czechoslovakia is plain: The independence of nations and the liberty of men are today still under challenge. The free parts of the world will survive only if they are capable of maintaining their strength. . . . Peace remains our objective. But we shall never achieve it by wishful thinking, nor by disunity, nor by weakness."²³ Simultaneous with all the agreements of the previous paragraph, Johnson also steadily increased the American military presence in Southeast Asia from 35,000 in 1965 to over 500,000 in 1968²⁴ because ". . . a Communist military takeover in South Vietnam would lead to developments that could imperil the security of the American people for generations to come. . . . If we had not drawn the line against aggression in Vietnam . . . some American President someday would have to draw the line somewhere else."²⁵ The Soviet leaders, on the other hand, made clear their position on Vietnam: "The Soviet Union will not remain unconcerned about the fate of a fraternal socialist state; she will be ready to render it all needed help."²⁶

²¹ Johnson, Special Message to the Senate on the Astronaut Assistance and Return Agreement, July 15, 1968, *ibid.*, 810.

²² Lyndon B. Johnson, *The Vantage Point: Perspectives on the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), 473.

²³ Johnson, Remarks Before the 50th Annual National Convention of the American Legion, September 10, 1968, *ibid.*, 937.

²⁴ Paul Hammond, *Cold War and Détente: The American Foreign Policy Process Since 1945* (New York: Harcourt Brace Jovanovich, Inc., 1975), 231.

²⁵ *Ibid.*, 939.

²⁶ *Pravda*, February 1, 1965, cited in Adam B. Ulam, *The Rivals: America & Russia Since World War II* (New York: Penguin Books, 1971), 360.

George Herring aptly concluded that the quest for peace and the cold war dynamic coexisted in a sort of transition period during Johnson's tenure. "The Johnson years thus marked a time of adjustment between the unqualified globalism and militant anticommunism of the early Kennedy years and the détente and retrenchment of Richard Nixon and Henry Kissinger. . . . The cold war underwent significant modification during the Johnson years. The international system was changing from the bipolar structure of the immediate post-World War II years to a 'polycentric' system with multiple centers of power."²⁷ In the words of another scholar, "As the Vietnam War illustrated, the pursuit of détente did not end Cold War assumptions and behavior."²⁸

Johnson, International Cooperation in Space, and the Outer Space Treaty

The Outer Space Treaty was perhaps the most heralded of the agreements directly relevant to the space arena indicative of some closing of the gap between the USSR and the United States. It was one of two developments in the international cooperation in space field during the Johnson administration, both of which were extensions of initiatives that began during Kennedy's term. First, the Dryden-Blagonravov talks and initiatives resulting from them continued. However, neither the talks nor the resulting actions led to any significant level of United States-Soviet cooperation in space. The assessment of those who participated in the Dryden-Blagonravov experiments during the Kennedy administration remained the same during the Johnson administration: "The performance of the Soviet participants on these projects for many years is best described as indifferent."²⁹ Another NASA insider concurred. "With regard to substantive matters, the Soviet participation, like water, tended to seek lower levels."³⁰

²⁷ George C. Herring, "Introduction," Guide, *Lyndon B. Johnson National Security Files, Agency File, 1963 - 1969*, a microfilm project, (Bethesda, MD: University Publications of America, 1993), v.

²⁸ Frank Costigliola, "Lyndon B. Johnson, Germany, and 'the End of the Cold War,'" in Warren I. Cohen and Nancy Bernkopf Tucker, editors, *Lyndon Johnson Confronts the World: American Foreign Policy, 1963-1968* (New York and Cambridge: Cambridge University Press, 1994), 207.

²⁹ Homer E. Newell, *Beyond the Atmosphere: Early Years of Space Science*, NASA SP-4211 (Washington, DC: USGPO, 1980), 313. Newell was NASA's associate administrator for space science and applications during the 1960s.

³⁰ Arnold Frutkin, *International Cooperation in Space* (Englewood Cliffs, NJ: Prentice-Hall, 1965), 103. Frutkin was NASA's Director of International Affairs in the 1960s.

It will be recalled from chapter 6 that in 1962-63 the United States and USSR signed agreements on coordinating their efforts in certain aspects of communications satellite experiments, meteorology satellites, worldwide geomagnetic surveying, and exchange of experimental data pertaining to bioastronautics and space medicine. According to one analysis, "the Soviet performance was disappointing. By the end of 1972, only the communications project had been completed." For instance, while the two countries agreed to exchange information on bioastronautics and space medicine in October 1965, the Soviets did not submit any research data until January 1970.³¹ In a general sense the Soviets regularly failed to respond to the frequent and wide-ranging American offers for cooperation in space, exchange of information, visits to each others' facilities, observation of each others' launches, etc.³² Early in Johnson's presidency Webb wrote Johnson, "No new high-level U.S. initiative is recommended until the Soviet Union has a further opportunity to discharge its current obligations under the existing NASA-USSR Academy agreement."³³ Since the Soviets made little effort to 'discharge its current obligations' under the initial Dryden-Blagonravov agreements, the situation progressed very little over the course of Johnson's tenure.

Webb's summary to Johnson on this issue late in 1964 can represent the United States-Soviet cooperation in space situation until the end of Johnson's presidency:

Our experience since June suggests that the Soviets are willing to cooperate in a generalized and limited way, but that they remain relatively inflexible with respect to commitments in negotiation and are laggard in execution. Their performance does not seriously reflect the assurances . . . that the Soviet Union is receptive to expanded cooperation in space research. . . . For the immediate future, it might be useful to convey to the top Soviet leadership . . . our dissatisfaction with the painfully slow and limited progress to date, as well with Soviet reluctance to enter into reasonable arrangements for implementing agreements.³⁴

³¹ David S.F. Portree, *Thirty Years Together: A Chronology of U.S.-Soviet Space Cooperation*, NASA Contractor Report 185707 (NASA, Johnson Space Center, 1993), 7.

³² Richard Hirsch and Joseph Trento, *The National Aeronautics and Space Administration* (New York: Praeger Publishers, 1973), 151.

³³ James E. Webb, letter to Johnson, January 28, 1964, Tab 4, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA, 2. Declassified at author's request.

³⁴ Webb, Memorandum to Johnson, Review of Developments in United States Cooperation with the Soviet Union in Outer Space Matters, December 18, 1964, NSA PD document 1045, p. 3.

The next year Webb echoed his earlier sentiments, "The plain fact is that the Soviets have been competitors in this field and not cooperators." Dryden added, "I would describe the situation as a form of limited coordination of programs and exchange of information rather than a true cooperation. . . . They have not responded to any proposals which would involve an intimate association and exposure of their hardware to our view or anything in the nature of a joint group working together."³⁵

Nor could Webb report any change in 1966 in the Soviet attitude toward cooperating in space: "We have looked for evidence that they are interested and found none. In fact, I would say the evidence has been the other way. . . . they show no evidence of any kind of giving us a key or even a partial key, that might unlock the door to cooperation."³⁶ The stalemate continued into 1967 with Webb commenting, "We have made repeated efforts to persuade the Soviets to enter new projects, but our initiatives have not been accepted. . . . We regret that the Soviets have not been prepared to move more rapidly and broadly. . . . It has been made plain again and again that we stand ready to explore any and all possibilities for meaningful cooperation."³⁷ The foremost scholarly analysis of the United States-USSR cooperative effort summarized, "As 1968 faded into 1969 and a new Administration prepared to take over in Washington, the watchword for space in both the United States and the Soviet Union was success in ongoing competition, not greater cooperation."³⁸ Given the lack of genuine Soviet interest, there is simply very little more to report concerning direct United States-Soviet cooperation until the Apollo-Soyuz Test Project in 1975 (which was "the result, not the cause, of political détente"³⁹), well beyond the scope of the dissertation.

³⁵ Congress, House, Committee on Appropriations, *Independent Offices Appropriations for 1966*, Hearings, part 2, 89th Congress, 1st Session, April, 1965, p. 1006-07.

³⁶ Cited in Portree, *supra*, 7.

³⁷ Webb, Report, United States-USSR Space Cooperation - Experience and Projections, January 30, 1967, folder: Administrator's Reference and Backup Book, box 133, James Webb papers, HSTL, 2-3.

³⁸ Dodd L. Harvey and Linda C. Ciccoritti, *U.S.-Soviet Cooperation in Space* (Miami, FL: Monographs in International Affairs, Center for Advanced International Studies, 1974), 187.

³⁹ Walter McDougall, "Technocracy and Statecraft in the Space Age - Toward the History of a Saltation," *American Historical Review* 87 (October 1982): 1022.

However, the second prong of the international cooperation in space effort during the Johnson presidency involved the United States and USSR within the forum of the United Nations and the Outer Space Treaty of 1967. This treaty essentially codified the principles enunciated in the two UN resolutions in the fall of 1963 (numbers 1884 and 1962, see chapters 6 and 8 for details) which banned the orbiting of weapons of mass destruction and which reserved space generally for peaceful purposes only, respectively. The fact that the United States-USSR cold war relationship had progressed at least to the point where they could work together in the UN, plus the mutual tacit acceptance of overhead satellite reconnaissance, meant that the resolutions could evolve, albeit very slowly, into a treaty between 1963 and 1967.

On May 7, 1966 Johnson publicly called for a treaty that would make official the UN resolutions from almost three years earlier.⁴⁰ Events moved quickly from there. Both the United States and USSR introduced draft treaties into the UN in June and by December the two main spacefaring nations worked together within COPUOS to draft a full treaty text. The UN opened it for signatures on January 27, 1967 and more than sixty nations including the United States and the USSR quickly signed. The United States Senate ratified the treaty 88-0 on April 25, 1967. McNamara assured the Senate the United States could verify its provisions "through our space observation and other technical surveillance systems."⁴¹ The treaty entered into force on October 10, 1967. In essence, it made official the resolutions of four years earlier: it was forbidden to place weapons of mass destruction in outer space or on celestial bodies; it restricted military activities on celestial bodies; it barred claims of sovereignty and national appropriation; and it generally reserved space for peaceful uses only.⁴² As McDougall has pointed out, however, the treaty "denuclearized outer space and demilitarized the moon. But it did not demilitarize outer space."⁴³ Both the United States and the USSR were free to continue their military activities in space such

⁴⁰ Johnson, Statement on the Need for a Treaty Governing Exploration of Celestial Bodies. May 7, 1966, *Public Papers of the President, 1966* (Washington, DC: USGPO, 1967), 487.

⁴¹ Cited in Raymond L. Garthoff, "Banning the Bomb in Outer Space," *International Security* 5 (1980/81): 37.

⁴² The full text is available in State Department, *United States Treaties and Other International Agreements*, volume 18, part 3 (Washington, DC: USGPO, 1967), 2412-18.

⁴³ Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., 1985), 417.

as reconnaissance, navigation, communications, early warning, etc., so long as they avoided deploying offensive weapons of mass destruction in space. While the process of simply codifying principles promulgated four years earlier is by no means a major diplomatic breakthrough, it can perhaps at least be considered both noteworthy and indicative of some small thawing in the previously universally frigid United States-USSR relationship. Further, it is one admittedly small indication that Johnson did not want to extend the competitive dynamic in space beyond Apollo and the quest to be the first to land on the moon.

Johnson, Space Policy, Prestige, and Budgets

Johnson's space policy had two main thrusts. First, he did maintain enough of a commitment to the "space for prestige" principle to ensure that Apollo was adequately funded and stayed on schedule to land Americans on the moon by the end of the decade. Second, however, was the fact that within a fiscal environment increasingly constrained by the Vietnam war and exploding social welfare spending, his commitment to competing in space was not great enough to impel him to approve any large, ambitious, and expensive next-generation follow-on space projects. In fact, the next major commitment to a large space system after Kennedy's lunar landing speech in May 1961 did not come until January 1972, when Nixon approved construction of the space shuttle. This lack of desire to extend space competition beyond Apollo was also strengthened by the above described perceived lessening of cold war tensions with the Soviets. Related to these two general principles was the fact that concerning military space he continued to rely, as had Kennedy, on the conclusions of McNamara concerning the DoD's space requirements. As long as McNamara continued to see some value in MOL, it continued. By mid-1969, when both McNamara and Johnson had left their positions, Nixon terminated it.

Space and Prestige

There are similarities between Johnson's pronouncements on space policy and his declarations on the cold war. Just as he could call for a continued strong military effort in support of the containment policy while also supporting détente, so could he also call for continuing the Apollo competitive effort while not extending the competitive ethic beyond it. Perhaps the primary factor in Johnson's desire to limit the space for prestige competitive dynamic to the Apollo program was related to economic consid-

erations. One of Johnson's first acts as President was to make clear that all agencies would hold the FY65 budget "to the barest minimum consistent with the efficient discharge of our domestic and foreign responsibilities;" therefore each departmental head must "submit to me promptly a . . . statement of the steps which you propose to take in the next year to tighten your operations and effect savings."⁴⁴

These economy measures impacted NASA as hard as, if not harder than, other agencies. In December 1963 Johnson told Webb concerning the FY65 budget, "I've just got to get some kind of a tax bill through, and Harry Byrd [powerful Democratic senator from West Virginia] will not support it unless I guarantee I will hold expenditures of NASA under \$5 billion and I want you to do that." It will be recalled that NASA's FY64 budget had been \$5.1 billion. Webb later admitted that once Johnson ". . . became president, he had a different set of problems than he had had before. He was not quite as free to press those areas that he had a particular interest in; he had to look at the total."⁴⁵ Johnson's only mention of space in his first State of the Union address mixed both the competitive and the cooperative dynamic: "We must assure our pre-eminence in the peaceful exploration of outer space, focusing on an expedition to the moon in this decade - in cooperation with others if possible, alone if necessary."⁴⁶

There is no shortage in the historical records of Johnson statements that are firmly in the space for prestige/competitive camp. In January 1964 Johnson said, "If the goal of being first in space is to be achieved and maintained, there can be no slackening of effort and no dampening of enthusiasm for space achievements."⁴⁷ He wrote for a popular magazine, "The fate of free society - and the human values it upholds - is inalterably tied to what happens in outer space, as humankind's ultimate dimension."⁴⁸ Later

⁴⁴ Johnson, Memorandum for the Heads of Departments and Agencies, November 30, 1963, folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, De-classified items, NHDRC, 1-2.

⁴⁵ Both men cited in Nathan C. Goldman, *Space Policy: An Introduction* (Ames, IA: Iowa State University Press, 1992), 12.

⁴⁶ Johnson, State of the Union Address, January 8, 1964, *Public Papers of the President, 1963-64*, 117.

⁴⁷ Johnson, Introduction to, Executive Office of the President, *U.S. Aeronautics and Space Activities, 1963*, Report to the Congress from the President of the United States, January 27, 1964, NSA MUS document 329, p. 1.

⁴⁸ Johnson, "The Politics of the Space Age," *Saturday Evening Post*, (February 29, 1964): 22.

that spring in a speech Johnson averred, "For the United States has nothing to fear from peaceful competition. We welcome it and we will win it."⁴⁹ Or in the fall of 1964: "I recognize that we cannot be the leader of the world and the follower in space. . . . We cannot be second in space and first in the world. . . . As long as I'm permitted to lead this country I will never accept a place second to any other nation in this field."⁵⁰ Khrushchev seemed to agree, as he stated in June 1964, "And in the not too distant future we plan to fly to the Moon. Not to live there, but to see what is going on there. And we shall reach the moon."⁵¹

However, in January 1964 the State Department concluded, "The Soviet Union and the United States have backed into a race for the moon for psychological and prestige reasons. . . . Whether the Soviet Union regards itself as engaged in a 'race' with the United States for a moon landing has not yet been proven."⁵² The CIA reported in May 1964, "It has been almost a year since the Soviets orbited a manned satellite."⁵³ In March 1965 Dryden wrote Johnson, "There is no evidence that they [Soviets] are building a booster as large as Saturn V," the type and size required to go to the moon. Dryden continued, "At present there is no indication of effort peculiar to a manned lunar landing effort as, for example, re-entry tests at speeds equivalent to lunar return."⁵⁴ At a minimum, there were elements within the executive branch

⁴⁹ Johnson, Remarks on Foreign Affairs to the Associated Press, April 20, 1964 *Public Papers of the President, 1963-64*, 495.

⁵⁰ Johnson, Remarks After Inspecting Space Facilities at Cape Kennedy, September 15, 1964, *ibid.*, p. 1071.

⁵¹ In Pravda, June 20, 1964, cited in Charles S. Sheldon, A Comparison of the United States and Soviet Space Programs, Paper No. 10, Program of Policy Studies in Science and Technology, George Washington University, June 1965, SPI unnumbered document, 34.

⁵² State Department, Policy Planning Council, Special Assistant for Soviet Bloc Politico-Military Affairs, Planning Implications for National Security of Outer Space in the 1970s, January 30, 1964, SPI document 1538, p. 15.

⁵³ CIA, Memorandum, Forecast of Soviet Space Spectaculars in Balance of 1964, May 30, 1964, folder: LBJ Library/Declassified Space Documents, box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC, 1.

⁵⁴ Dryden, Report to Johnson on the Soviet space program, March 1965, folder: Eisenhower Library - Space Race, box: Presidents, Eisenhower, Photos, Presidential Library [document may be misfiled], NHDRC, 5.

wondering if a race really did exist. While such questions at the highest policy making levels probably could not imperil the progress of Apollo toward the moon, they would make it difficult for any follow-on effort to gain momentum.

There seemed to be a growing perception in Johnson's mind during his presidency that the United States had, in fact, become the leader in space. In August 1964 after a successful American lunar probe he declared, "We started behind in space. . . . We know this morning that the United States has achieved fully the leadership we have sought for free men."⁵⁵ In February 1965 he even seemed to back off a bit from the basic space for prestige idea: "Our purpose is not, and I think all of you realize never will be, just national prestige. Our purpose remains firmly fixed on the fixed objective of peace. The frontier of space is a frontier that we believe all mankind can and should explore together for peaceful purposes."⁵⁶ The next month he told the press ". . . it was really a mistake to regard space exploration as a contest which can be tallied on any box score. . . . Now the progress of our own program is very satisfactory to me in every respect. . . . And while the Soviet Union is ahead of us in some aspects of space, U.S. leadership is clear and decisive and we are ahead of them in other realms on which we have particularly concentrated."⁵⁷ Less than a week later he emphasized that the United States space program had "but one purpose - the purpose of exploring space for the service of peace and the benefit of all mankind. We are not concerned with stunts and spectaculars, but we are concerned with sure and with steady progress."⁵⁸ By mid-1965 Johnson went so far as to proclaim, "But the need of man - the need of these times - is not for arms races or moon races, not for races into space or races to the bottom of the sea. If competition there must be, we are ready and we are willing always to take up the challenge and to commit our country to its tasks. But this is a moment when the opportunity is open and beckoning for men of all nations to

⁵⁵ Johnson, Remarks Following a Briefing with Space Scientists on the Successful Flight to the Moon, August 1, 1964, *Public Papers of the President, 1963-64*, 922.

⁵⁶ Johnson, Remarks Following a Briefing at NASA, February 25, 1965, *Public Papers of the President, 1965*, p. 215.

⁵⁷ Johnson, News Conference, March 20, 1965, *ibid.*, 306.

⁵⁸ Johnson, Remarks at the Presentation of the NASA Awards, March 26, 1965, *ibid.*, 330.

come and to take a walk together toward peace.”⁵⁹ While Johnson would not sacrifice this leadership by slowing Apollo, he was also unlikely to spend billions on some Apollo follow-on such as a human flight to Mars if he had concluded that the United States was leading the Soviets in overall space capability.

All the above examples illustrating the dual thrust of Johnson’s space thinking - maintaining Kennedy’s commitment to competing with Apollo but demonstrating little willingness or desire to extend competition beyond the lunar landing - were taken from the early stage of Johnson’s presidency. However, the same dynamic could be traced with a plethora of documents and citations from mid-1965 and on but the fundamental point would remain unchanged. As he summarized in his memoirs, “Early in my Presidency I reaffirmed the national policy that I had helped to forge. ‘Our plan to place a man on the moon in a decade remains unchanged,’ I said in my first budget message. I restated that plan often enough to insure that there was no mistaking our purposes. . . . Throughout my time in office I supported the program to the limit of my ability.”⁶⁰ What changed during his own term as president was the increasing financial demands upon Johnson stemming from the Great Society and America’s escalating involvement in Southeast Asia.

Budgetary Slide

The real squeeze began in the fall of 1965 as the FY67 budget process began. For reference and overview purposes, the last Kennedy and all of the Johnson NASA and military space budgets follow, in billions of dollars.⁶¹

<u>Fiscal Year</u>	<u>NASA</u>	<u>DoD</u>
1964	5.100	1.599
1965	5.250	1.574
1966	5.175	1.689
1967	4.966	1.664

⁵⁹ Johnson, Commencement Address at Catholic University, June 6, 1965, *ibid.*, 644.

⁶⁰ Johnson, *Vantage Point*, *supra*, 283.

⁶¹ NASA, *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities* (Washington, DC: USGPO, 1996), A-30.

1968	4.587	1.922
1969	3.991	2.013

As a general trend over Johnson's full term, the NASA budget declined over a billion dollars, greater than 20 percent. The DoD's space budget increased some \$400 million or almost 25 percent, due mostly to increasing MOL expenditures before its cancellation in FY70. Similarly total NASA employment, including civil service positions as well as contractor jobs, peaked in 1965 at 411,000 and dropped to: 396,000 in 1966; 309,100 in 1967; 246,200 in 1968; and 218,000 in 1969.⁶²

The timing of NASA's budget slide starting in 1965 was unfortunate, as one analyst explains, because Apollo was in full stride and reaching its highest financial requirements and because, "The heavy NASA spending coincided with the far-larger sums that were suddenly needed by the escalation of the Vietnam War in 1965." While Johnson did permit BoB Director Charles Schultze to reduce NASA's FY67 budget to an even \$5 billion, he did protect it from further BoB-desired cuts because it was agreed such cuts would mean delaying the lunar landing until the 1970s.⁶³ The increase in spending for the Vietnam war was from \$4.6 billion in FY66 to \$10.3 billion in FY67.⁶⁴

Webb told Congress in February 1966 that Johnson's \$5.0 billion NASA budget figure for FY67 "... reflects the President's determination to hold open for another year the major decisions on future programs - decisions on whether to make use of the space operational systems, space know-how, and facilities we have worked so hard to build up, or to begin their liquidation."⁶⁵ In private Vice President and Chairman of the NASC Hubert Humphrey tried to explain, "It is my firm belief that these cuts in no sense

⁶² Jane Van Nimmen, Leonard C. Bruno, and Robert Rosholt, *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), Figure 1-4, p. 14. 1969 figure from Arnold S. Levine, *Managing NASA in the Apollo Era* (Washington, DC: USGPO, 1982), 107.

⁶³ Robert A. Divine, "Lyndon B. Johnson and the Politics of Space," chap. in his *The Johnson Years, Volume Two: Vietnam, the Environment, and Science* (Lawrence, KS: The University of Kansas Press, 1987), 237-39.

⁶⁴ Emmette S. Redford and Orion F. White, *What Manned Space Program After Reaching the Moon?: Government Attempts to Decide, 1962-1968* (Syracuse, NY: The Inter-University Case Program, January 1971), 177.

⁶⁵ Cited in W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 139.

reflect any decreased interest in or evaluation of the importance of the national space program. Rather, such cuts reflect realities - military, political, and economic - of the war in Vietnam."⁶⁶ During the FY67 budget battle in January 1966, for the first time since Sputnik, a president did not mention space in the State of the Union address. An internal NASA history simply summarized, "The emphasis in 1966 was on carrying out 'Great Society' programs."⁶⁷ Testifying to Congress, Seamans more delicately stated that the FY67 NASA budget cut of \$163 million "... reflects the constraints upon the total national budget imposed by the needs to balance our commitments overseas and our needs at home. . . . The budget constraints do not permit the initiation of major new projects."⁶⁸

Congressmen also commented on the linkage between FY67 NASA budget cuts and Vietnam. Representative Olin Teague, D-TX, who served as Chairman of the Manned Space Flight Subcommittee of the House space committee said, "The war in Vietnam has already forced a substantial reduction in the NASA budget for the coming year."⁶⁹ Finally, Humphrey explained to the NASC in November 1966, "The President has a lot of problems to solve, with the requirements of the war in Viet Nam carrying heavy priority."⁷⁰ McNamara later outlined for Johnson the incremental cost of the Vietnam war "over

⁶⁶ Hubert Humphrey, Opening Statement by the Vice President, NASC Meeting, Discussion of FY67 Budgets, March 3, 1966, folder: NASC Meeting March 3, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA, 2.

⁶⁷ NASA, *Preliminary History of NASA: 1963-1969*, Final Edition, Administrative Histories Project, January 15, 1969, NHDRC, p. II-14.

⁶⁸ Seamans [now NASA's Deputy Administrator after Dryden's death in late 1965], Statement before the Subcommittee on Manned Space Flight, House Committee on Science and Astronautics, FY67 budget, February 18, 1966, folder: Seamans, House of Representatives, Seamans subseries, Deputy Administrators series, NHDRC, 3.

⁶⁹ May 3, 1966, cited in Ken Hechler, *The Endless Space Frontier: A History of the House Committee on Science and Astronautics, 1959-1978*, America Astronautical Society History Series, Vol. 4 (San Diego, CA: Univelt, Inc., 1982), 185.

⁷⁰ Humphrey, Introductory Statement by the Vice President, NASC Meeting November 15, 1966, folder: NASC Meeting, November 15, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

and above the normal costs of the Defense establishment.” FY66 - \$9.4 billion; FY67 - \$19.7; FY68 - projected \$22.4.⁷¹

A Case Study of the 1968 Budget

The FY68 budget negotiations over the course of the second half of 1966 and most of 1967 were even worse for NASA, resulting in a budget cut of almost half a billion dollars. Webb fought the good fight, maintaining 1968 was a “year of decision” because NASA would require \$6 billion in FY68 “to stay in business with what we have, but that \$7 billion would be required to really move forward with things.”⁷² In the end, he would get just over \$4.5 billion. When it became clear Johnson was not prepared to ask for seven, or six, but closer to five billion dollars, Webb wrote him: “I have done my best to obtain support in Congress for the reductions you have had to make and to minimize any political risk to your administration from the fact that we are operating substantially under what would be the most efficient program. . . .” Webb again stated that FY68’s budget would likely be “. . . a major turning point with indicated requirements on the order of \$6 billion of new obligational authority.”⁷³

In August BoB Director Schultze told Webb he should count on only \$5.15 billion for FY68: “In view of the above-normal expenditures in Southeast Asia, and the threat of inflationary pressures on the economy, it is not feasible to plan on the program extensions and program levels” Webb desired. Schultze continued, “In fact, in the light of our review of budget totals it is quite likely that we shall have to go below this figure in the final budget.”⁷⁴ Webb characterized this figure as disastrous and that such a budget would cause the “liquidation of some of the capabilities which we have built up.” Webb spoke quite

⁷¹ McNamara, Memorandum for the President, Southeast Asia Costs, October 26, 1966, in George C. Herring, General Editor, *Lyndon B. Johnson National Security Files, Agency File, 1963 - 1969*, microfilmed from the holdings of the Lyndon B. Johnson Library, Robert E. Lester, Project Coordinator (Bethesda, MD: University Publications of America, 1993), reel 9, p. 1.

⁷² NASC, Summary Minutes, NASC Meeting June 15, 1966, folder: NASC Meeting June 15, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA, 3.

⁷³ Webb, letter to Johnson, May 16, 1966, folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC, 1.

⁷⁴ Charles L. Schultze, BoB Director, Letter to Webb, FY68 budget, August 13, 1966, folder: Space-NASA-1966, box 611, RG 359, Office of Science and Technology, NARA, 1. Declassified at author's request.

frankly and seemed to question Johnson's commitment to the space program: "There has not been a single important new space project started since you became President. Under the 1968 guidelines very little looking to the future can be done next year. Struggle as I have to try to put myself in your place and see this from your point of view, I cannot avoid a strong feeling that this is not in the best interests of the country. . . . We cannot deliver the kind of successes we have had with the thin budgetary margins of the past three years."⁷⁵

Schultze replied for Johnson that, "The space program is not a WPA" and given the fact that the budget for secondary and elementary education was only \$2 billion and that for the war on poverty only \$1.8 billion, "I don't believe that in the context of continued fighting in Vietnam we can afford *another* \$600 million to \$1 billion in the space program in 1968."⁷⁶ In December 1966 Johnson sided with Schultze, recommending a NASA budget for FY68 of just over \$5 billion.⁷⁷ Johnson's fundamental mindset can be seen in his remark in March 1966, "We haven't wiped out all the deficiencies in our program yet, but we have caught up and we are pulling ahead."⁷⁸ Therefore, there seemed little reason for Johnson to fight for any increases in the NASA budget, nor to strongly resist slight yearly reductions as long as they did not imperil the lunar landing goal.

An author who has carefully examined tapes of internal NASA meetings related that during the FY68 budget process Webb spoke of LBJ: "We are not dealing with the guy who said, 'I am your champion, I will go out there and fight your battles, I will get Kennedy and his Congress to give you the money.' He is saying, 'By God, I have got problems and you fellows are not cooperating with me. You could have reduced your expenditures last year and helped me out, you didn't do it.'" Webb lamented that the operative principle in the BoB was "cost-effectiveness:" "It is a byword over there. . . . I must say that

⁷⁵ Webb, Letter to Johnson, August 26, 1966, SPI document 860, pp. 2-3.

⁷⁶ Schultze, Memorandum to Johnson, FY68 budget proposals, September 20, 1966, SPI document 859, p. 2. Emphasis in original.

⁷⁷ Divine, "Johnson and the Politics of Space," *supra*, 240-42.

⁷⁸ Cited in Evert Clark, "President Reaffirms Goal of Moon Landing by 1970," *New York Times*, March 17, 1966, p. 1.

all I get is a cold, stony demand that we act like the Post Office when I go over there.”⁷⁹ Johnson publicly stated, “We are not doing everything in space that we are technologically capable of doing. Rather, we are choosing those projects that give us the greatest return on our investment.”⁸⁰ An internal government report concluded concerning the United States space effort of 1966, “The United States, which as recently as two years ago was on the defensive with respect to the Soviets, now commands a clear cut lead. In the eyes of world opinion, the United States was exhibiting a virtuosity and capability that the Soviets were not matching, and which evidenced leadership in space.”⁸¹ Again, there seems little reason for Johnson to have felt compelled to extend the competition for prestige beyond Apollo, nor to increase NASA’s budget or oppose its gradual decline.

Webb may have thought his troubles with the FY68 budget were over when the process moved from the White House to Congress in 1967 but the situation only became bleaker from the NASA Administrator’s perspective. Infinitely worse than financial concerns was the tragic fire on January 27, 1967 as Apollo-Saturn 204 was undergoing a series of simulation tests on the launch pad at Cape Kennedy, FL. A fire broke out in the pure oxygen atmosphere of the capsule and killed Virgil “Gus” Grissom, Roger Chaffee and Edward White. This horrific accident came on the eve of Congress beginning its deliberations over the FY68 NASA budget. When it entered the serious stages of budgetary negotiations in the summer of 1967, “Congress seemed out to punish NASA - and Webb. It was in a cutting mood.”⁸² In August the House Appropriations Committee recommended a cut of half a billion dollars in the \$5.1 billion administration request. To Webb’s consternation, Johnson did not oppose this. One scholar explained, “Johnson felt he had to show Congress he would cut space to get his new tax bill (a 10 percent

⁷⁹ Levine, *Managing NASA in the Apollo Era*, 127.

⁸⁰ Johnson, Annual Budget Message to the Congress, January 24, 1967, *Public Papers of the President, 1967*, p. 50.

⁸¹ United States Information Agency report on the worldwide perception of United States space activities in 1966, as cited in “Johnson Sees Major Soviet Space Efforts Upcoming,” *Space Business Daily*, February 2, 1967, p. 180.

⁸² Lambright, *Powering Apollo*, 184.

tax increase). Senator [Margaret Chase] Smith was furious and charged that Johnson had 'literally pulled the rug out from under those who direct the space program.'"⁸³

Between Johnson's recommendation for a \$5.1 billion FY68 NASA budget late in 1966 and his acceptance of a \$4.5 billion level in August 1967, several things had changed. McNamara informed Johnson in November that the true cost of the Vietnam war each year was going to be more in the vicinity of \$20 billion per year, not the \$10-12 he had previously estimated. In addition, the federal budget deficit skyrocketed from Johnson's announced figure in January 1966 of \$1.8 billion to an all-time high by the end of the year of \$9 billion.⁸⁴ As a result of the disastrous situation that developed in 1966, austerity was the goal for 1967. As Humphrey told the NASC in June 1967, "I know there are going to be problems this year with the budget, not so much because of the Apollo accident as because of the other major budgetary strains, particularly from the Vietnam war."⁸⁵ In addition, indications continued that perhaps America was indeed ahead in the space race and that an all-out crash effort was no longer necessary. A CIA estimate in March 1967 concluded, "Two years ago, we estimated that the Soviet manned lunar landing program was probably not intended to be competitive with the Apollo program as then projected, i.e., aimed at the 1968-1969 time period. We believe this is still the case. . . . We believe that the most likely date [for a Soviet lunar landing attempt] is sometime in the 1970-1971 time period."⁸⁶

Johnson himself explained when he signed the reduced NASA FY68 appropriation in August 1967, "Under other circumstances I would have opposed such a cut. However, conditions have greatly changed since I submitted my January budget request." He detailed the "economic and fiscal realities now facing the Nation:" increased expenditures and reduced revenues; a threatened deficit as high as \$29

⁸³ Ibid., 185.

⁸⁴ Deborah Shapley, *Pride and Power: The Life and Times of Robert McNamara* (Boston: Little, Brown, and Company, 1993), 375.

⁸⁵ Statement by the Vice President, Summary Minutes, NASC Meeting, June 22, 1967, folder: NASC Meeting, June 22, 1967, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA. 1.

⁸⁶ CIA, NIE 11-1-67, The Soviet Space Program, March 2, 1967, folder: CIA National Intelligence Estimates, shelf XI-B-3, box: Federal Agencies, CIA, National Intelligence Estimates, NHDRC. 2.

billion; and a 10 percent tax surcharge he has asked the American people to bear. Therefore, as every federal dollar is scrutinized, “. . . in the process some hard choices must be made. The test is to distinguish between the necessary and the desirable. Our task is to pare the desirable. The administration and the Congress must face up to these changes in the space program.” Johnson said he knew the reductions in NASA’s budget “will require the deferral and reduction of some desirable space projects. Yet, in the face of the present circumstances, I join with the Congress and accept this reduction.” Johnson closed by emphasizing the cuts did not indicate a lack of confidence in NASA or the space program. However, “Because the times have placed more urgent demands upon our resources, we must now moderate our efforts in certain space projects.”⁸⁷ Clearly in Johnson’s mind by 1967, the space program above and beyond Apollo was desirable but not necessary. Privately, Johnson could simply relate to Webb that he did not “. . . choose or prefer to take one dime from my [NASA] budget for space appropriations this year and agreed to do so only because [House Committee on] Ways and Means in effect forced me to agree to effect some reductions or lose the tax bill.”⁸⁸ Within the general gloom, however, Apollo’s budget within NASA was “left virtually intact at about \$2.5 billion.”⁸⁹ The Apollo program director explained that the cuts within NASA were highly selective “. . . and, with relatively few exceptions, the Apollo program budget has been appropriated at approximately the required level I have stated.”⁹⁰

Indicative of Johnson’s mindset was a remark two months later at a ceremony for the Outer Space Treaty: “The first decade of the space age has witnessed a kind of contest. We have been engaged in competitive spacemanship. We have accomplished much, but we have also wasted much energy and resources in duplicated or overlapping effort.”⁹¹ There remained in Johnson, however, enough of a

⁸⁷ Johnson, Statement Upon Signing Appropriations Bill for NASA, August 21, 1967, *Public Papers of the President, 1967*, 800-01.

⁸⁸ Johnson, Memorandum for Webb, September 29, 1967, folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC, 1.

⁸⁹ Joshua Lederberg, “Demands of Vietnam Hobble Our Steps to Outer World,” *Washington Post*, March 2, 1968, p. 1.

⁹⁰ Gene Mayhall and D.O. Appleton, “Military Applications of Space Are Inevitable: Interview with Major General Sam Phillips,” *Data* (June 1968): 17.

commitment to the space program, particularly Project Apollo, for him to disapprove any and all proposals from Congress or the BoB for reductions that would endanger the lunar landing or its accomplishment within the 1960s. His rhetoric could still heat up when he spoke at NASA facilities, as he did in December 1967: "If we think second, and if we look third, then we are going to wind up not being first. . . . We may not always proceed at the pace we desire. I regret - I deeply regret - that there have been reductions and there will be more." However, "We will not surrender our station. We will not abandon our dream. We will never evacuate the frontiers of space to any other nation."⁹² Nevertheless, by January 1968 Seamans had resigned and by the end of the year so would Webb.

Said one scholarly team concerning the difficulties for NASA created by rising social welfare spending, along with the Vietnam war's costs, "There was little support in the Johnson administration or Congress to increase NASA's budget: indeed, Great Society programs and the Vietnam war were pushing in the opposite direction."⁹³ Johnson also tied NASA's budgetary difficulties at least in part to the Great Society: "One of my regrets is that because of the demands, of the cities, and the poor, and the hungry, and the educational and health needs, that we found it necessary in the last few budgets of the Space Administration to trim our sails, and to make reductions that the Administrators did not think wise."⁹⁴ Seamans told this dissertation's author that NASA leaders never ". . . really understood the pressure that Johnson was under. . . . Johnson had an agenda. His number one priority was his social agenda, the Great Society. And then he was saddled with Southeast Asia. So there were real pressures on Johnson and what had been near and dear to his heart, namely the space program, was looming extremely insignificant."⁹⁵

⁹¹ Johnson, Remarks at a Ceremony Marking the Entry Into Force of the Outer Space Treaty, October 10, 1967, *ibid.*, 920.

⁹² Johnson, Remarks Following an Inspection of NASA's Michoud Assembly Facility, December 12, 1967, *ibid.*, 1123-24.

⁹³ W. David Compton and Charles D. Benson, *Living and Working in Space: A History of Skylab*, NASA SP-4208 (Washington, DC: USGPO, 1983), 20.

⁹⁴ Oral history interview of Johnson, July 5, 1969, *supra*, 24.

⁹⁵ Oral history interview of Seamans, July 5, 1996, by the author.

Arnold S. Levine postulated, "NASA was not a closed system: one cannot entirely discount the budgetary impact of the Vietnam War and Johnson's policy of . . . continued social service spending."⁹⁶ A NASA document comparing three categories of federal expenditures for actual FY67 budgets and expected amounts for FY68 and 69 (in billions of dollars) illustrated the fundamental reality of the impact of the Vietnam war and Great Society programs on Johnson space policy: national defense - 74.2, 80.3, 83.9; space research and technology - 5.4, 4.8, 4.5; health/labor/welfare - 30.0, 45.3, 50.4.⁹⁷ In his final budget message Johnson stated that his "efforts to widen the opportunities for the disadvantaged" meant that "outlays for major social programs have risen by \$37.4 billion, more than doubling since 1964. This is twice the rate of increase of outlays for any other category of Government program."⁹⁸ One scholar concluded, "The Great Society and the Vietnam war diverted attention from the challenges of spectacular technology as Americans were humbled by rural guerrillas or by the persistence of urban poverty and pre-technology prejudice."⁹⁹ Another succinctly posited, "The expensive Great Society domestic programs and the unexpectedly high expenditures of the Vietnam War caused a serious financial squeeze that tested LBJ's commitment to winning the space race and led to a sharp reduction in NASA's budget."¹⁰⁰ By the end of Johnson's tenure, "The social agenda and the war spawned large demonstrations and engendered deep feelings that made NASA seem increasingly irrelevant."¹⁰¹

⁹⁶ Levine, *Managing NASA in the Apollo Era*, 207.

⁹⁷ NASA, FY1969 Budget Briefing, January 29, 1968, folder: Webb Budget Briefing, Webb sub-series, Administrators series, NHDRC, 1.

⁹⁸ Johnson, Annual Budget Message to the Congress, January 15, 1969, *Public Papers of the President, 1968-69*, 1281.

⁹⁹ Charles S. Maier, "Science, Politics, and Defense in the Eisenhower Era," Introduction to George B. Kistiakowsky, *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology* (Cambridge, MA and London: Harvard University Press, 1976), lxvi.

¹⁰⁰ Divine, "Politics of Space," *supra*, 236.

¹⁰¹ Goldman, *Space Policy*, 14.

At the press conference in September 1968 announcing his retirement,¹⁰² Webb was forthright. "I am not satisfied with the program. I am not satisfied that we as a nation have not been able to go forward to achieve a first position in space. What this really means is we are going to be in a second position for some time to come." When asked if the need to spend money elsewhere, such as for Vietnam and anti-poverty programs, had taken the urgency out of the space program, Webb replied, "I think that is right. . . . I think a good many people have tended to use the space program as a sort of whipping boy. . . . in essence if it were not for the fiscal problems faced by the President and the Director of the Budget I would believe that the program would have been supported in the Congress and the country at a higher level than it has been."¹⁰³ A lengthy BoB review a month later designed to inform the incoming administration of the NASA and general space program situation opened with what was by October 1968 an accepted fact: "The resource requirements of the Viet Nam war and of pressing domestic needs, coupled with an apparent acceptance of the Soviet presence in space, have tended to push the civil space program down the scale of national priorities. As funding requirements for on-going programs have declined, it has been very difficult to obtain funds for new starts." The BoB actually turned the competition for prestige argument on its head when it suggested, "An alternative to the policy of competition would be a policy of cooperation with U.S.S.R. in large manned flight endeavors. Reasons for proceeding other than competition in-

¹⁰² There were probably both positive and negative factors that led Webb to decide to resign in the fall of 1968. He had completed seven years at the helm of one of the government's largest bureaucracies and was probably weary from the constant budgetary battles he had waged since 1965. However, "Webb had grown increasingly concerned about the presidential transition, worried that some last-minute interference from the new administration would wreck everything. While he had done all in his power to give his team a fighting chance to succeed, he did not believe that he would be with them at the finish line. . . . NASA had to be depoliticized, in fact and in appearance." Accordingly, Webb and Johnson felt it would be best if Webb resigned so that Deputy Administrator Thomas Paine ". . . would have to succeed Webb sooner rather than later so he could build a record of technical success. To depoliticize the transition at NASA, the change should take place before the November election." While the actual announcement of Webb's resignation on September 16, 1968 may have been a bit more hasty than Webb would have preferred, it seems both men agreed it was time for Webb to resign. See Lambright, *Powering Apollo*, 200-01.

¹⁰³ Webb, Press Conference transcript, September 16, 1968, folder: Webb, Press Conferences, Webb subseries, Administrators series, NHDRC, 4-6.

cluding enhancing the national prestige, advancing the general technology, or simply faith that manned space flight will ultimately return benefits to mankind in ways now unknown and unforeseen."¹⁰⁴

This detailed case study of the FY68 budget could be repeated with the same level of detail for the FY69 process whereby NASA's budget dropped to just under \$4 billion or the FY70 process that cut NASA's funding to \$3.75 billion. But the fundamental conclusions would remain the same. As Apollo approached its climactic moment of the July 1969 lunar landing, NASA's presidential, public, and congressional support was eroding. NASA was, and would be for several years, unable to forge either an internal consensus on what the next steps in space beyond Apollo should be, or an external coalition to support future goals. NASA seemed adrift and Johnson appeared unwilling to prescribe a course of action beyond ensuring that the lunar landing took place on time.

To the Moon

One of the most visible symbols of Project Apollo was the giant Saturn V rocket blasting off from Cape Kennedy, FL. Few realize that one consequence of NASA's budgetary restrictions was that NASA suspended production of the Saturn V in 1967 and officially discontinued it in 1970.¹⁰⁵ However, despite any criticisms that might come his way for reducing NASA's budget, one fundamental fact remained: Johnson did maintain sufficient momentum and financing for Project Apollo to enable Americans to land on the moon on July 20, 1969, six months after he left the White House. Neil Armstrong and Edwin "Buzz" Aldrin planted the American flag on the lunar surface five-and-a-half months before the deadline Kennedy had established eight years earlier. While presidential programmatic implementers such as Johnson often receive less attention and credit than presidential programmatic originators, one must give Lyndon Johnson due credit for shepherding NASA and Project Apollo through the tumultuous 1960s in a manner that enabled the organization and the program to fulfill a high visibility pledge made by a previous president. Johnson himself explained: "People frequently refer to our program to reach the moon during the 1960s as a national commitment. It was not. There was no commitment on succeeding Con-

¹⁰⁴ BoB, Report, National Aeronautics and Space Administration: Highlight Summary, October 30, 1968, reprinted in *Exploring the Unknown*, supra, 496-97.

¹⁰⁵ Levine, *Managing NASA in the Apollo Era*, 226.

gresses to supply funds on a continuing basis. The program had to be justified, and money appropriated year after year. This support was not always easy to obtain."¹⁰⁶

On the other hand, "... the space program's grip on the public imagination had begun to fade even before the first moon landing. . . . what had been imagined as a natural process of growth in manned space travel had by 1970 come to be seen as a technological exercise that wasn't worth the effort. In the political arena, the opposition to manned space flight was not just a matter of indifference, but of growing hostility. . . . A new all-purpose political truism entered the language: 'If this nation can put a man on the moon, then it should be able to. . .'"¹⁰⁷ Exploration of that development is beyond the scope of this work. However, if Lyndon Johnson is given a large measure of credit for the success of Project Apollo, he must also be seen as chiefly responsible for the fact that "Much of the prestige America hoped to gain on the surface of the moon had already been lost in the jungles of Southeast Asia by the summer of 1969."¹⁰⁸

Continuity in the Air Force and OSD Perspectives

This chapter now turns to the institutional climate that existed between NASA and DoD. As with the realm of space policy discussed above, the organizational relationship during the Johnson era also had significant continuity with the Kennedy period. The Air Force continued to desire a more rigorous investigation of the military applications of humans in space. The OSD continued to demand quantitative justification for new space-based systems. Throughout the 1960s, however, one can see the Air Force beginning to embrace the idea that operations in space should be done only if they offer a cost or an operational advantage over ground-based means of accomplishing a particular mission. Once work on MOL began, most of the OSD-USAF tension centered on exactly what it would be designed to do and how fast work should proceed, and so will be discussed in the next chapter.

¹⁰⁶ Cited in Vaughn Davis Bornet, *The Presidency of Lyndon B. Johnson* (Lawrence, Kansas: The University Press of Kansas, 1983), 215.

¹⁰⁷ Charles Murray and Catherine Bly Cox, *Apollo: The Race to the Moon* (New York: Simon and Schuster, 1989), 447-48.

¹⁰⁸ Clayton R. Koppes, "The Militarization of the American Space Program," *Virginia Quarterly Review* 60 (1984): 15.

The Air Force and Space

Project Forecast was an Air Force-organized effort late in the Kennedy administration to “. . . reassess Air Force missions and weapon systems in light of current policy and the most likely developments in the period extending to 1975. Emphasis was placed on a study of the technological requirements involved.”¹⁰⁹ The Air Force appeared to be concerned over its inability to secure OSD approval for space and other systems, as well as the cancellation of Dynasoar, Skybolt, the nuclear airplane, and other cutting-edge technological ventures. Project Forecast, headed by Schriever and his AFSC, was designed to chart a reasonable and attainable future course for the Air Force. Its space-related sections revealed the continuity in Air Force thinking with previous declarations. Nodding to the nation’s space for peace policy, the Air Force emphasized, “At the same time, we must take such steps as are necessary to defend ourselves and our allies. We should develop and apply space competence to enhance our ability to cope with any military challenge in outer space, to keep the peace and to deter aggression.” At times the USAF even seemed to echo the OSD’s building block rhetoric: “Within the national space program, present military efforts toward manned space missions should be to establish the necessary technological base and experience upon which to expand, with the shortest possible time lag, in the event firm military manned space requirements are established in the future.”¹¹⁰

On the other hand, the Air Force remained firmly committed to the principle that humans in space would be an integral component of any long-term military presence in space: “Manned space flight is not only desirable but necessary to significantly improve current military space capabilities.” The USAF admitted that “Space flight today is where aviation was at Kitty Hawk.” Despite the fact that “Today, the only seriously considered missions for spacecraft are the message carrying and ground surveillance roles once considered the useful limits of aircraft” the Air Force believed that just as in the case early aircraft “. . . the ingenuity and flexibility of man as an operator made many military functions possible, and with his increasing experience these functions contributed significantly to national defense. It

¹⁰⁹ USAF, AFSC, *Project Forecast: Policy and Military Considerations Report*, January 1964, K168.154-12, AFHRA, R-1. Declassified at author’s request.

¹¹⁰ *Ibid.*, V-10.

seems inevitable that this process will occur with space systems as well. . . . It is certain that the full military potential of space will be obtained only through the development of manned space systems.”¹¹¹ The Air Force remained firmly wedded to the concept that officers in space would be required to maximize the use of space for national defense. Therefore, the MOL was key.

Springing from Project Forecast was a new set of “military space capabilities which are the goals of the United States Air Force through the 1970 time period” which CSAF Curtis LeMay issued on April 20, 1964. LeMay listed two general categories. First was “Early space operational objectives required and attainable in the 1960s.” Included here were seven systems: a satellite system capable of collecting systematically or on request pre- and post-strike intelligence data on the Sino-Soviet area; a “credible and operationally effective” early warning system against ballistic missile attack; a non-orbital satellite interception and negation system; an orbital system for inspection and negation of uncooperative satellites; an enhanced communications satellite; a next-generation weather satellite; and a recoverable satellite system “able to effect co-orbital rendezvous and docking for the purposes of conducting space rescue and logistic support operations.” The second overall category included those “Objectives which must await extensive and important technological advances.” This consisted of three systems: one to perform interception of ballistic missiles; one capable of quick reaction and economic launching of varied mission modules into orbit; and a “large-scale, manned maneuverable vehicle system containing elements of defense, strike, reconnaissance and command control, located and operating in relatively permanent orbit.”¹¹² While ambitious, at least this 1964 set of objectives recognized that there would be limits in the short-term to what the Air Force could expect to accomplish, and further, prioritized among these objectives.

The role of MOL would be to experiment with the feasibility of the reconnaissance-related missions, the highest priority category of all. As an internal Air Force document stated late in 1964, MOL

¹¹¹ Ibid., VIII-10, G-8.

¹¹² USAF, Memorandum on Space Objectives, to multiple recipients, with cover letter from CSAF LeMay, April 20, 1964, folder: 208, Box B208, Curtis LeMay papers, LoC, cover letter and 1-2. Declassified at author's request.

"... has as its immediate objective the assessment of man's utility in performing military functions related to reconnaissance, surveillance, inspection, detection, and tracking mission areas."¹¹³ The MOL was at the heart of the Air Force's program. As the office in the Pentagon responsible for monitoring its progress said, "MOL is our entree to manned space capabilities. . . . MOL is the focus of our man in space efforts and is, therefore, the key program to the development of future military missions in space."¹¹⁴ Headquarters Air Force MOL personnel regularly stated,

The Air Force believes that man is the key to the future in space, and that certain military tasks and systems [reconnaissance] will become feasible only through the discriminatory intelligence of man. . . . We consider the MOL to be a bridge from R&D experiments, techniques, and embryonic operational experience to our being able to conduct the more classical military missions and roles in space if and when they are needed. . . . History indicates that throughout time new technologies and new regions have been thoroughly exploited for military advantage. The USAF exploration of space is aimed at preventing a mid-twentieth century 'Trojan Horse' from being built 160 miles overhead of our Nation. An exploration program such as the MOL appears to be the best insurance which can be provided for the Nation's complete defense posture.¹¹⁵

By 1965, near the end of his Air Force career, Schriever was no longer delivering speeches describing how he felt "inhibited" or "shackled" by the nation's space for peace policy. That complaint faded from standard Air Force space rhetoric. It was replaced with Schriever maintaining that MOL was simply "... one part of a large and varied space effort. The MOL does not exist in isolation from other military developments in space, and it certainly does not exist in isolation from the programs of the National Aeronautics and Space Administration. We have worked closely with NASA in defining the program." On the other hand, he still vigorously protested what he considered artificial divisions in the United States space program: "I think it is high time for people to stop trying to divide the national space effort into a series of airtight little compartments, each of which can be neatly labeled as 'peaceful' or

¹¹³ Kenneth W. Schultze, Colonel, USAF, Assistant for Manned Orbiting Laboratory (AFRMO), Office of the Deputy Chief of Staff for Research and Development, Inputs on MOL to the Chief of Staff's Posture Statement, November 6, 1964, IRIS 1002995, AFHSO, 1.

¹¹⁴ AFRMO, Report, Supporting Presentations During FY 1966 Congressional Budget Hearings, December 22, 1964, IRIS 1002995, AFHSO, 1.

¹¹⁵ AFRMO, Unclassified Supporting Witness Statement, Manned Space Programs, March 9, 1965, IRIS 1002996, AFHSO, 1, 8.

'nonpeaceful,' . . . in actual fact, all of our space programs serve peace. . . ."¹¹⁶ Schriever's contribution to a book stated, "Both NASA and the Department of Defense have valid and distinctive roles in the national space program. . . . Preparation for national defense in space is not inconsistent with the national policy that space be use for peaceful purposes."¹¹⁷

By the end of this dissertation's period, the Air Force's philosophy on space had evolved to the point where pragmatic considerations ruled and there was a much closer congruence between Air Force declarations and the OSD's of many years earlier. For instance, a 1968 version of the USAF Planning Concepts stated the Air Force would develop space capabilities only when space afforded the sole reasonable means to perform an essential military task.¹¹⁸ General James Ferguson, who took over from Schriever as AFSC Commander in 1966, stated in 1968, "We have to prove that space projects can pay their way - that our space program can earn its keep. . . . military space systems must show distinct promise of directly enhancing national security. Further, those space programs must represent either the only way to get the job done or the most cost-effective way of doing it." Ferguson hastened to add that MOL was justified because it ". . . will provide an operational testbed for the development of equipment for use in both manned and unmanned military space projects; additionally, it will provide empirical 'cost-effectiveness' and technical data on the ability of man to perform militarily useful tasks in space."¹¹⁹ Virtually gone from rhetoric was the old "high ground" idea of occupying space because if the United States did not, the Soviets were sure to. Of greater concern by the end of the 1960s was justifying space R&D in accordance with the edicts of PPBS and systems analysis. Space was indisputably a place in which particular missions might be performed, not a mission in and of itself. Given the fact that DDR&E

¹¹⁶ Schriever, speech to the American Institute of Aeronautics and Astronautics, October 12, 1965, IRIS 1013465, AFHRA, 1-2.

¹¹⁷ Schriever, "Does the Military Have a Role in Space?" in Lillian Levy, *Space: Its Impact on Man and Society* (New York: W.W. Norton & Company, 1965), 62-63.

¹¹⁸ Gerald T. Cantwell, *The Air Force in Space, Fiscal Year 1968, Part I*, October 1970, NSA MUS document 336, p. 1.

¹¹⁹ James Ferguson, General, USAF, AFSC/CC, Speech on Bioastronautics and Orbiting Space Stations, June 25, 1968, James Ferguson file, Biographical series, NHDRC, 2, 6. Emphasis in original.

Brown, McNamara's foremost space expert, became Secretary of the Air Force in October 1965, this came as no great surprise. In addition, the Outer Space Treaty of 1967 made it virtually certain that the military would not emplace or maintain an offensive presence in space.

The OSD as Continuing Watchdog

The OSD continued to insist that Air Force space programs meet two criteria: the systems had to mesh with NASA efforts and they had to hold the promise of enhancing military power and effectiveness. As DDR&E Brown explained, "The Secretary of Defense continues to insist that, as a fundamental criterion, the Department of Defense space program must be coordinated closely with that of the National Aeronautics and Space Administration in all important areas and that DOD and NASA programs taken together constitute an integrated national program."¹²⁰ At the beginning of the Johnson administration McNamara explained, "Space technology is still very new and its implications, especially for the military mission, cannot be fully foreseen at this time. This is particularly true with regard to the potentials of a 'man-in-space.' . . . the time has come when, in our judgment, these efforts should be more sharply focused on areas which hold the greatest promise of military utility" and so the DoD had embarked on the MOL program as a military experimental orbital platform.¹²¹ Albert G. Hall became Deputy DDR&E for Space in the Johnson administration and stated,

Sober consideration of military potential in space has not yet developed a decisive case for manned space supremacy as a primary constituent of military supremacy. . . . While we are not yet able to define a specific military mission for man in space, we believe we should purchase insurance against the possibility that a manned operational system may be required in the middle 1970s. This insurance will take the form of a flight test system to determine man's effectiveness in performing useful military functions in space. . . . The MOL program will be directed specifically to fulfilling the need for an early, effective determination of man's utility in performing military functions in space. . . . Despite several years of thinking about the subject, there is no clear, common agreement on the ultimate military significance of manned space technology. Perhaps there is a mission for military man in space. Perhaps not.¹²²

¹²⁰ Congress, Committee on Appropriations, *Department of Defense Appropriations for 1966*, hearings, part 5, 89th Congress, 1st Session, April 1965, p. 14.

¹²¹ McNamara, Statement before the House Armed Services Committee on the 1965 Defense Budget, January 27, 1964, folder: Unclassified Statement, FY65, box 32, RG 200, Robert McNamara papers, NARA, 104.

¹²² Deputy DDR&E for Space Albert G. Hall, Speech on The Objectives of the Military Space Program, February 5, 1964, Albert G. Hall file, Biographical series, NHDRC, 1, 6-7, 11. Emphasis in original.

On the one hand (as seen above) the Air Force had moved toward the OSD position that space had to "pay its own way" in the sense of justifying its costs when compared to similar ground-based systems. On the other hand, the OSD at least allowed for an investigation of the potential utility of military officers in space. Since each party had made some concessions to the other's viewpoint during the late Kennedy and throughout the Johnson presidency, the level of tension decreased, but did not disappear, between the OSD and the USAF.

One must not form the impression, however, that McNamara and the OSD were sudden converts to the military man-in-space cause. As DDR&E Brown stated late in 1964, "The problems of manned military space flights are, and generally will continue to be, more complex and more difficult and expensive to solve. I want strongly to emphasize that as of this time even the requirement for manned military operations is still in question."¹²³ McNamara clearly shared this sentiment, stating in March 1965, "The orbital laboratory might be manned or unmanned. . . . the important point is not whether the man is there. The important point is that there may be a military requirement and we should meet it."¹²⁴ As will be seen in the next chapter, McNamara's granting official approval to the Air Force in December 1963 to study the MOL for possible construction was only the first of many steps the Air Force had to take in justifying to the OSD that the MOL should actually be built. The OSD had not been convinced by the end of 1963 that the MOL should actually be fabricated; Johnson would make that decision in August 1965. Rather, the OSD was simply willing to let the Air Force officially investigate this possibility throughout 1964 and early to mid-1965. However, this required money and the FY66 DoD military space budget was \$1.67 billion (20 percent of all DoD R&D funding), or \$124 million more than FY65 and double that of FY61.¹²⁵

¹²³ Congress, House, Committee on Appropriations, *Department of Defense Appropriations for 1965*, hearings, part 5, 88th Congress, 2nd Session, 1964, p. 12.

¹²⁴ Congress, Committee on Appropriations, *Department of Defense Appropriations for 1966*, hearings, part 3, 89th Congress, 1st Session, March 1965, p. 170.

¹²⁵ McNamara, Statement before the House Armed Services Committee on the 1966 Defense Budget, February 18, 1965, *supra*. 137.

Continuity in NASA-DoD Relations I: Overview and Coordination

Just as there was some lessening of tensions between the policy making levels of the Air Force and the OSD, so to did the tension and rivalry between NASA and the DoD described in chapter 7 begin to abate, though not disappear, in the Johnson administration. Only two primary areas of direct NASA-DoD conflict continued to play themselves out during the Johnson era, and they both involved the question of exactly how much support the Air Force would continue to render to NASA, not whether or not such support would continue to be forthcoming. These two areas of conflict were NASA reimbursement of DoD support expenses (mostly at ETR), and how many military officers would continue to be transferred to NASA.

An Overview of NASA-DoD Relations in the Johnson Era

Webb summarized in 1964, "I am happy to report that during the past six years there has been a steady strengthening of understanding, coordination, and mutual support between the Air Force and NASA. . . . [We] are cooperating effectively in many ways which benefit both agencies and which serve the best interests of the nation. . . . The rapid rate of progress in the NASA part of the national space program over the past six years would have been impossible without the launch vehicles and related technology derived from Air Force missile programs." He detailed some of the extensive coordinating and supporting aspects of the relationship in: the national launch vehicle program; space medicine; operations support; cross-use of facilities; astronauts (3 of 7 Mercury and 13 of 29 Gemini astronauts were Air Force officers); management personnel like Brigadier General Samuel Phillips; improved liaison; and the GPPB.¹²⁶ Johnson's report on 1964's space activities said during the year there developed ". . . a much improved degree of cooperation and coordinating action as between the major agencies engaged in the national space program. Not only was there improvement in the exchange of information between such agencies, but there also was a useful interagency assignment of experienced personnel."¹²⁷ Johnson

¹²⁶ James Webb, "NASA and the USAF: A Space Age Partnership," *The Airman* (August 1964): 7ff.

¹²⁷ Executive Office of the President, *United States Aeronautics and Space Activities, 1964*, January 27, 1965, copy available at NHDRC, 7.

himself said, "I doubt that we have spent but very few hours resolving disagreements between the Administrator of the Space Agency and the Secretary of Defense, and yet I have seen hundreds of reasons why we could have had serious disagreements and had the Government divided among itself."¹²⁸

Shortly before he retired Schriever seemed to have reconciled himself to NASA's existence: "I get impatient with allegations that the two agencies are in some kind of wasteful competition. Where there is competition, it is productive, not wasteful. The NASA and Air Force programs are complementary, not duplicating."¹²⁹ Schriever's successor at AFSC, James Ferguson declared, "In our space program, it is hard to tell today which area of national effort - the civilian or the military - has contributed most to the exploration and use of space for our benefit here on earth. And it doesn't really matter. The close relationships between National Aeronautics and Space Administration and the Department of Defense have always been very evident to those of us engaged in the NASA-DOD partnership."¹³⁰ While there was likely some residual resentment within portions of the Air Force that it had been superseded in space by NASA, by the end of the 1960s the leaders of that portion of the Air Force that worked most closely with NASA apparently harbored little animosity toward NASA and pledged continued cooperation and support.

NASA-DoD Coordination Specifically

In essence, the comprehensive coordination network of boards, panels, subpanels, groups, and committees that originated in the Eisenhower administration and grew deeper and more extensive in the Kennedy administration continued to function as expected during the Johnson years. An internal NASA report of April 1969 called the overall coordinating mechanism "generally adequate," with the AACB and its six panels remaining the most important component. However, the report did state that as with any

¹²⁸ Johnson, Remarks Following a Briefing at NASA, February 25, 1965, *Public Papers of the President, 1965*, p. 216.

¹²⁹ Schriever, Speech to the Aviation Writers Association, May 1966, reprinted in the *Congressional Record*, June 22, 1966, p. A3274.

¹³⁰ James Ferguson, Speech on May 20, 1968, Science in a Synergistic Society, James Ferguson file, Biographical series, NHDRC, 6. Emphasis in original.

complex and multifaceted phenomenon involving two large bureaucracies "the effectiveness with which these organizational entities are being utilized could be increased." Its main suggestion seemed to allude to the Webb-McNamara difficulties discussed in chapter 7 because it stated (even though both men had recently departed their positions). "The absence of a close working relationship at the top renders it much more difficult to overcome the divisive tendencies that are bound to be latently present where two dynamic agencies have responsibilities and aspirations in a common field of activity."¹³¹

The assorted groups continued to add to the ever-growing body of NASA-DoD official agreements. As has been discussed in chapters 4 and 7, a government report from 1965 listed 88 separate "major" NASA-DoD agreements,¹³² and a comprehensive NASA accounting from 1967 described 176 NASA-DoD accords out of a total NASA inventory of 302 interagency agreements.¹³³ A government accounting in 1965 determined that NASA, at the headquarters level alone, was involved in 203 interagency coordination and advisory bodies.¹³⁴ Obviously this dissertation is not the place for a description of each one. What is important, however, is the degree to which almost every possible facet of the NASA-DoD relationship was legalistically and contractually spelled out.¹³⁵ During the Johnson administration some major coordination agreements included: operation of the instrumentation ships and aircraft collecting data from space vehicles; coordination of the space medicine-bioastronautics design, development, and test program; separate agreements for the coordination of the geodetic, communication, navigation and weather satellite programs; reimbursement to the United States Navy for recovery operations; and coordination of the respective space science programs. In addition, of course, these formal agreements were

¹³¹ W. Fred Boone, Consultant to the NASA Administrator, Memorandum for Dr. Eggers, Study on National Needs and NASA Capabilities - NASA-DOD Relationships, April 8, 1969, folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC, 3, 5.

¹³² Congress, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*, Thirteenth Report, House Report No. 445, 89th Cong. 1st Session, June 4, 1965, 123-132.

¹³³ NASA, Inventory of NASA Interagency Relationships, October 13, 1967, folder: Copies of Agreements, DoD subseries, Federal Agencies series, NHDRC.

¹³⁴ *Government Operations in Space*, 101. Some, but not a significant proportion, of these would have been with other agencies besides the DoD.

¹³⁵ See chapter 7 for some examples.

supplemented by many informal understandings and working arrangements which contributed to the meshing of the programs into a single national effort.

In addition the Launch Vehicle Panel of the AACB conducted multiple and extensive studies designed to achieve closer integration of the nation's family of launch vehicles. However, the coordination effort in the field of space boosters was one which continued to show relatively little progress compared to other aspects of the coordination process. The detailed case study of the LLVPG in chapter 7 explained the general pattern that emerged for these launch vehicle coordination efforts that, in fact, continued to exist during the Johnson administration. Neither NASA nor the DoD had any great desire to rely on the other organization to provide it with a critical member of its space launch vehicle fleet, thereby ceding control over a vital aspect of its overall space program. The fundamental conclusion of these launch vehicle studies continued to be: "No financial gain would accrue from either reducing the numbers of different launch vehicles in the national inventory or from substituting vehicles in existing programs."¹³⁶ A November 1968 study explained the reasons why, for the past ten years, such attempts to closely integrate NASA's and DoD's launch vehicle fleets had not succeeded. First, "The lack of future manned mission requirements prevents focusing of the vehicle studies" because neither the DoD nor NASA knew exactly what it expected to accomplish with human spaceflight well into the future. Second, "A relative comparison of the costs of the candidate vehicles is not possible because they are not based on equivalent studies and have not been developed on common ground rules." Therefore, this study could only recommend that "Studies be continued by both agencies as required."¹³⁷

The simple fact was that, "Most of the studies involving AACB panels were technical and non-controversial."¹³⁸ Their goal was to ensure there was as little duplication as possible between the NASA

¹³⁶ Gerald T. Cantwell, *The Air Force in Space, Fiscal Year 1965* (Washington, DC: USAF HDLO, April 1968), NSA MUS document 331, p. 4. Specifically, Cantwell was summarizing the July 1964 conclusions of an AACB Launch Vehicle Panel study.

¹³⁷ AACB, Launch Vehicle Panel, Report, Intermediate-Class Launch Vehicles for Future DOD/NASA Manned Missions, November 1968, folder: AACB Launch Vehicle Study - 1968, box: Aeronautics and Astronautics Coordinating Board # 4, NHDRC, 15.

¹³⁸ Levine, *Managing NASA in the Apollo Era*, 229.

and DoD space programs. While the coordination effort was not always 100 percent effective, such as in the launch vehicle field, for the most part it was a good faith attempt at ensuring the American taxpayer did not pay twice for a particular space capability. A congressional report concisely summarized, "Because of this cooperative NASA-DOD effort a more aggressive and meaningful space program is being pursued."¹³⁹ An Air Force history described the extensive 1968-69 study effort concerning injecting greater economy and efficiency into the NASA and DoD space programs and ensuring the nation's space program was not wasting money due to duplication. After over a year of effort, the institutions concluded the space programs not wasteful or duplicative: "Conclusions drawn from the study effort attested to the effectiveness of DOD-NASA cooperation and indicated that significant economies were not possible unless specific projects were curtailed or canceled."¹⁴⁰ The NASA-DoD coordination effort was not a perfect one but it did seem to be functioning well by the end of the 1960s.

Continuity in NASA-DoD Relations II: Support and Tension/Rivalry

Some Illustrative Statistics

The report describing America's 1966 space activities mentioned there were over 400 separately identifiable activities in which the DoD was supporting NASA at an annual cost of at least \$500 million. These activities included those with which the reader will be familiar from past chapters: national launch ranges and host base support; launch vehicles; recovery operations; use of aircraft and ships; and construction by the Army Corps of Engineers were only some of the categories with higher dollar totals mentioned.¹⁴¹ McNamara regularly pointed this out in his testimony while emphasizing that only 80 percent of the DoD's costs were reimbursed by NASA.¹⁴² This figure of half a billion dollars annual DoD support

¹³⁹ Congress, House, Committee on Science and Astronautics, Subcommittee on NASA Oversight, *The NASA-DOD Relationship*, Report, 88th Congress, 2nd Session, 1964, p. 6.

¹⁴⁰ Jacob Neufeld, *The Air Force in Space, Fiscal Years 1969-1970* (Washington, DC: Office of Air Force History, July, 1972), 10.

¹⁴¹ Executive Office of the President, *US Aeronautics and Space Activities, 1966*, Report to the Congress from the President, January 1, 1967, NSA MUS document 333, p. 72.

¹⁴² McNamara, Statement before a Joint Session of the Senate Armed Services Committee and the Senate Subcommittee on Department of Defense Appropriations on the FY 1968 Defense Budget, January 23, 1967, folder: Unclassified Statement, box 69, RG 200, Robert McNamara papers, NARA, 129. Declassified at author's request.

to NASA held relatively steady, though by early 1968 the DDR&E stated it had declined to \$407 million; however, NASA's reimbursement level had dropped to 62 percent.¹⁴³ By the next year this figure had dropped to \$225 million.¹⁴⁴ According to one calculation, the USAF had supplied the launch vehicles and launch crews for 67 percent of American space launches through June 1968. In addition, the Air Force provided 95 percent of the United States' space tracking and control capability.¹⁴⁵ This sampling of facts illustrates two points. First, DoD's support for NASA was at a significant level throughout the 1960s but was declining near the end of the decade as NASA completed its first ten years of existence and began to enjoy a greater institutional autonomy and independence from the DoD due to the development of its own capabilities and facilities. Second, the OSD believed NASA should reimburse a higher percentage of this support, even if the overall level was declining.

Specific Support for Gemini

A very basic outline of DoD support for NASA's three human spaceflight projects revealed the following. For Mercury, DoD provided astronauts, launch facilities, launch vehicles, range support, and recovery operations. For Gemini the DoD supplied most of the astronauts, participated in the training, launching and launch operations, developed the man-rated Titan II, conducted assorted checkout and operational procedures, provided range support and recovery forces, and provided some of the on-board experiments. For Apollo the DoD's role was limited to providing most of the astronauts, range support, and recovery forces.¹⁴⁶

¹⁴³ DDR&E John S. Foster, Statement to the Senate space committee, Department of Defense Activities in Space, 1967, March 26, 1968, folder: Space 1968, box 917, Clinton Anderson papers, LoC, I-30.

¹⁴⁴ According to the testimony of DDR&E Foster to the Senate space committee in June 1969 and summarized in "DOD/NASA Support Costs Revealed," *Armed Forces Management* (June 1969): 31. The *Aeronautics and Space Report of the President, 1969*, January 1970, p. 42, reported a similar figure for FY69 of \$235 million. Copy available in NHDRC.

¹⁴⁵ C. Brian Kelly, "Ten Years in the Outer Realm," *Data* (June 1968): 22.

¹⁴⁶ *The NASA-DOD Relationship*, 4.

By the end of the 1960s one assessment of the specific support DoD rendered to NASA Gemini and Apollo missions concluded, "It is now routine to gather support forces around a manned space flight with little confusion, duplication and wasted motion, dismiss these forces and repeat the process in a similar manner for the next mission." Any problems were on the order of minor aggravations.¹⁴⁷ A more specific listing of the functions the DoD (and particularly the Air Force) performed to support Gemini would include: supplying and launching the Agena target vehicle and its Atlas booster for rendezvous and docking exercises; supplying and man-rating the Titan II launch vehicle for the actual Gemini capsule; providing the actual launch facilities in Florida and much of the network, tracking, data acquisition, range, recovery, and medical functions associated with space launches; and supplying many of the supporting operations space launches required such as communications, security, transportation, photography, and public affairs personnel. As one Air Force document pointed out, "Support of Gemini operations is in many instances an added task to be performed by resources originally fully programmed for other purposes."¹⁴⁸

One of the more difficult challenges the Air Force faced in supporting Gemini was modifying the Titan II so that it could be considered safely capable of launching humans. In addition to retrofitting the vehicle with redundant systems for electrical power and flight control, replacing the inertial guidance with radio guidance, and installing a malfunction detection system, the Air Force confronted several technical problems. The Titan II's first stage engines had a tendency to oscillate longitudinally in what observers called "the pogo effect" in a manner severe enough to endanger human life. This problem cost \$3.3 million to fix. There were also problems of combustion instability in the second stage engine chambers that cost \$11.3 million to fix. The Air Force also spent \$1.7 million flight testing the vehicle to verify its fixes. Therefore, total Air Force expenses just to ensure the Titan II was ready for delivery to NASA were \$16.3

¹⁴⁷ Henry E. Clements, Colonel, USAF, *The Coordination of Manned Spaceflight Operations Between DOD and NASA*, Student Research Report No. 31, Industrial College of the Armed Forces, April 1969, p. 49.

¹⁴⁸ DoD, Manager for Manned Space Flight Support Operations, Overall Plan, Revised, Department of Defense Support for Project Gemini Operations, October 21, 1964, K243.04-34, AFHRA, II-1.

million.¹⁴⁹ Whereas a Titan in its ICBM configuration cost \$4-5 million, one modified as a Gemini booster cost \$19 million. A NASA document explained, "Necessary and stringent requirements were established by NASA. The responses to these requirements by the Air Force and by its contractors was usually prompt and vigorous."¹⁵⁰

The first Gemini mission was in April 1964 and the last in November 1966. Over the course of flights ranging up to almost 14 days, NASA perfected the necessary lunar prerequisite techniques of rendezvous, docking, personnel transfer, and EVA. For any single mission, DoD's contribution could include up to 11,301 personnel, 134 aircraft, 27 ships, and 13 worldwide tracking stations. At the beginning of the program Gemini's estimated total cost was \$531 million; it actually cost \$1.147 billion.¹⁵¹ NASA Deputy Administrator wrote the Secretary of the Air Force after Gemini's completion, "Jim Webb and I are very conscious of our debt to the Air Force officers and men who have played a major role in this program. Titan certainly performed magnificently throughout Gemini, and has earned our complete confidence and respect."¹⁵² There was also debt in the literal sense of continuing unreimbursed expenses for Gemini support. According to the DoD's accounting in millions of dollars:¹⁵³

¹⁴⁹ Gemini Program and Planning Board, Minutes of Meeting, February 1, 1965, IRIS 1002996, AFHSO, 2.

¹⁵⁰ Milton Rosen, Senior Scientist, NASA Office of Defense Affairs, Memorandum for Admiral Boone, Gemini Launch Vehicle Man-Rating, October 8, 1965, folder: USAF Gemini Role Documentation, Gemini series, NHDRC, 4.

¹⁵¹ Barton C. Hacker and James M. Grimwood, *On the Shoulders of Titans: A History of Project Gemini*, NASA SP-4203 (Washington, DC: USGPO, 1977), 387, 596.

¹⁵² Seamans, Letter to Harold Brown, November 22, 1966, folder: USAF Gemini Role Documentation, Gemini series, NHDRC, 1.

¹⁵³ Alfred C. Barree, Lieutenant Colonel, Policy and Plans Group, Directorate of Space, Deputy Chief of Staff for R&D, USAF, Memorandum for the Record, Summary Report - DOD Support of Project Gemini, April 17, 1967, IRIS 1003006, AFHSO, 1. Numerous other sources support this accounting. See for instance NASA's official Gemini history: Hacker and Grimwood, *Shoulders of Titans*, 595.

<u>Service</u>	<u>Reimbursed</u>	<u>Non-Reimbursed</u>	<u>Total</u>
USAF	435.564	54.455	490.019
USN	18.311	31.090	49.401
Army	1.246	.214	1.459
Total	455.140	85.772	540.912

Two facts therefore stood out. First, DoD's support of over half a billion dollars was the equivalent of one-half of Gemini's overall \$1.1 billion NASA budget. Second, DoD continued to absorb unreimbursed expenses on the order of 16 percent. As will be seen below, these unreimbursed expenses continued as one of the few major points of contention between NASA and the DoD.

Specific Support for Apollo

The Air Force submitted to the OSD on May 12, 1966 its official plan for rendering support to Project Apollo. McNamara approved it on July 28, 1966. One source related, "... the plan called for essentially the same kind of support provided Gemini, employing the identical service units."¹⁵⁴ One must quickly add, however, that Air Force support to Apollo did not include providing launch vehicles because Apollo was launched on the Saturn-family of boosters developed and procured by NASA. Therefore, DoD assistance continued in areas of ETR support, network operations, recovery, communications, meteorology, medical personnel and supplies, public affairs, etc. described above for Gemini. For instance, starting in 1965 85 percent of the Air Force's tracking equipment was modified so it could support Apollo requirements; this eventually cost \$50 million.¹⁵⁵

One noteworthy aspect of the DoD's support for Apollo was the use of DoD reconnaissance-related resources such as cameras and map-making facilities to survey the moon. In 1965 alone, "The DOD is currently engaged in 88 man years of work in support of Project APOLLO for NASA in the form

¹⁵⁴ Gerald T. Cantwell, *The Air Force in Space, Fiscal Year 1966* (Washington, DC: Office of Air Force History, 1969), 12.

¹⁵⁵ Charles D. Benson and William B. Faherty, *Moonport: A History of Apollo Launch Facilities and Operations*, NASA SP-4204 (Washington, DC: USGPO, 1978), 470.

of lunar maps, charts and other materials.”¹⁵⁶ The agreement for this function said the Air Force would provide technical assistance to NASA by developing and providing lunar mapping and survey flight equipment. Given the role of this equipment in the NRO specifically and satellite reconnaissance in general, the agreement delicately stated, “DOD security classifications and procedures, as prescribed by the Air Force for application to mapping and survey equipments furnished under this agreement, will be observed by both agencies.”¹⁵⁷ For instance, NASA’s Lunar Orbiter that photographed the surface of the moon in preparation for the lunar landings featured a camera system which was developed, in NASA’s words, “in a DOD project with classified aspects” with the Eastman Kodak Corporation. Since NASA wanted to deal with that company for Orbiter, “. . . arrangements were made with the appropriate element of DOD [NRO?] for the contractor to propose to NASA, under DOD supervision, a suitable unclassified camera system. NASA had no access at any time to the classified equipment. This procedure has proven to be very satisfactory and assures that any classified technology is appropriately protected.”¹⁵⁸

Secondary sources have recently plainly stated that Orbiter’s photographic system used a “high-resolution camera system [which] was a derivative of a spy satellite photo system created specifically for earth reconnaissance missions specified by the DOD.” This source added that its two lenses worked automatically and “with the precision of a Swiss watch” to take pictures of the lunar surface from 28 miles above it with one meter resolution. However, “Few NASA people were ever privy to many of the details of how the ‘black box’ actually worked, because they did not have ‘the need to know.’” All five of the Lunar Orbiter missions “worked extraordinarily well,” generating a total of 1,654 photographs.¹⁵⁹

¹⁵⁶ Executive Office of the President, *United States Aeronautical and Space Activities, 1965*, Report to Congress from the President, January 21, 1966, NSA MUS document 332, p. 68.

¹⁵⁷ Brockway McMillan, Undersecretary of the Air Force and Seamans, NASA Associate Administrator, DOD/NASA Agreement on the NASA Manned Lunar Mapping and Survey Program, April 20, 1964, SPI document 228, 1.

¹⁵⁸ James O. Spriggs, NASA member of, Ad Hoc Subpanel on Security Practices of the Supporting Space Research and Technology Panel of the AACB, Memorandum for the Record, Imagery from Space, February 16, 1967, folder: Resolution from Space, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁵⁹ James R. Hansen, *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo*, NASA SP-4308 (Washington, DC: USGPO, 1995), 328, 338, 346. “Need to know” refers to one of the two conditions that must be met for a person to be granted access to DoD classified material. First.

The trade press reported that the astronauts aboard Apollo 7 had taken 700 photographs of the earth's surface using "very high-resolution film developed for Air Force reconnaissance satellites." Therefore, the DoD had "... for the first time demanded seats on the NASA board selecting photographs for release. . . . NASA was permitted to release only 13 pictures" and officials doubted any more would ever be cleared.¹⁶⁰ The reality of pervasive secrecy concerning the NRO and American reconnaissance satellites pervaded even the relevant aspects of DoD's support to NASA human spaceflight projects.

Since this dissertation does not examine the entire Apollo program but only its portion up to Apollo 11's lunar landing in July 1969, complete figures for DoD support will not be presented. However, for the Apollo 11 mission the DoD provided 6,927 people, 54 aircraft and 9 ships.¹⁶¹ After the lunar landing new NASA Administrator Thomas Paine wrote new Secretary of Defense Melvin Laird to express NASA's "deep sense of gratitude" to the DoD for its many contributions to NASA human spaceflight over the years: "Without the assistance and cooperation of the Defense establishment, the nation would not have been able to achieve this goal." Paine pointed to the many "truly outstanding officers" such as Lieutenant General Samuel Phillips "who turned in a magnificent performance as Director of the Apollo Program. In these and many other ways, the Department of Defense has been one of the principal essential members of the Apollo team."¹⁶² NASA's Office of Defense Affairs concurred that the lunar landing "... could not have been accomplished without the vast amount of assistance and support received from

the person must have the appropriate level of clearance: Confidential, Secret, Top Secret, etc. Second, even with the proper clearance, a person must demonstrate a specific "need to know" the information for purposes of officially conducting one's assigned duties. Without a "need to know" even a properly cleared person will be denied access to a requested piece of information.

¹⁶⁰ Washington Roundup, *Aviation Week and Space Technology*, November 4, 1968, as cited in Erlend A. Kennan and Edmund H. Harvey, *Mission to the Moon: A Critical Examination of NASA and the Space Program* (New York: William Morrow & Company, 1969), 228.

¹⁶¹ James G. Smith, Colonel, Assistant for Public Affairs, Office of the DoD Manager for Manned Space Flight Support Operations, USAF, *Department of Defense Support: Apollo 11*, July 1969, folder: 1969, Manned Lunar Landing Program, Apollo 11, Department of Defense, box 108, Samuel Phillips papers, LoC, 5.

¹⁶² Thomas Paine, letter to Melvin Laird, August 11, 1969, folder: NASA/DOD Cooperation/Space Merger?, DoD subseries, Federal Agencies series, NHDRC, 1.

the Department of Defense.”¹⁶³ Even allowing for the standard inflated rhetoric in these bureaucratic sources, it nevertheless was undeniable that the DoD played a vital role in assuring Apollo 11 landed on the moon and safely returned its three astronauts to earth.

Support Could Lead to Tension I: Personnel

Chapters 4 and 7 have described the important role that the approximately 300 military officers played in providing NASA with valuable managerial talent and expertise during the late 1950s and 1960s. The highest ranking and probably most important figure was Brigadier (then later Major, then later, but still within NASA, Lieutenant) General Samuel C. Phillips, who served as Apollo program director. It will be recalled that his experience in the Air Force ICBM development program led him and Associate Administrator George Mueller (whose systems management expertise also came from working with the Air Force ICBM program, although on the civilian side) to reorient the Apollo test program from a lengthy stage-by-stage, system-by-system approach to the Air Force “all up” procedure. This meant “NASA could with reasonable confidence test the entire stack of stages in flight from the beginning, at great savings to budget and schedule.”¹⁶⁴ Wernher von Braun, whose normal methodical testing procedures were overruled in favor of all up testing later stated, “In retrospect it is clear that without all-up testing the first manned lunar landing could not have taken place as early as 1969.”¹⁶⁵ Phillips’ lasting reputation within NASA was such that after the space shuttle Challenger exploded in January 1986 he was asked to head up a review of NASA management and procedures.

However, not all was well in the NASA-DoD personnel arena. Some within the Air Force felt the procedure was unbalanced in that NASA received all the benefits and the Air Force provided all the personnel. Instead of requesting certain talented high-level managers such as Phillips or those at the colonel level, one step below him, NASA began asking for large blocks of more junior officers. For in-

¹⁶³ W. Fred Boone. *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32 (Washington, DC: USGPO, 1970), iii.

¹⁶⁴ Roger Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990*, NASA SP-4406 (Washington, DC: USGPO, 1989), 78.

¹⁶⁵ Cited in Murray and Cox, *Apollo*, 162.

stance, in April 1964 NASA Deputy Administrator Dryden wrote Secretary of the Air Force Zuckert to request 55 USAF officers be transferred to NASA to perform not management functions but the regular day-to-day duties of operating consoles, manning tracking stations, etc.¹⁶⁶ Zuckert replied he would like to avoid supplying officers just to alleviate NASA manpower shortages and would prefer “. . . to assign experienced officers of exceptional ability who . . . indicate an intent to return to the Air Force upon completion of their NASA tour.” After all, “. . . there is a limit to the numbers of such people who can be assigned to NASA [and so] we think that they should be placed in key and middle-management level positions.” Therefore, he suggested “. . . a joint review of the total program in light of our collective experience [which] would provide a sound basis for responding to your recent request, and would establish guidance for the continuing management of the program.”¹⁶⁷ Dryden agreed and Phillips was placed in charge of this review of DoD personnel transfer procedures.¹⁶⁸

This review under Phillips eventually validated 42 of the 55 NASA requests and forged new guidelines for future personnel transfers from DoD to NASA. The new September 15, 1964 NASA-DoD memorandum of understanding required NASA to first deplete civilian sources for filling its vacancies before turning to the Air Force. It also restricted future NASA requests for AF personnel to positions within the fields of engineering, physical/life sciences, and technical program management (not equipment operators) which required the specific education, experience or skills developed by that officer. By-name requests could be made only for colonels and generals.¹⁶⁹ Even within these new guidelines, how-

¹⁶⁶ Dryden, Letter to Zuckert, April 1, 1964, folder: 1964, Manned Lunar Landing Program, Personnel, Military, box 43, Samuel Phillips papers, LoC, 1.

¹⁶⁷ Zuckert, Letter to Dryden, May 5, 1964, folder: 1964, Manned Lunar Landing Program, Personnel, Military, box 43, Samuel Phillips papers, LoC, 1.

¹⁶⁸ Another problem in the background of the personnel issue is that the Air Force was getting back less than a quarter of the officers it sent to NASA. An accounting at the end of 1964 showed that the Air Force had sent 174 people to NASA and of the 80 who were no longer working there only 18 had returned to the Air Force because 46 separated from the service (many to continue working in NASA) and 16 retired (many to continue working with NASA). See John J. Anderson, Colonel, USAF, Assistant for Manned Space Flight, Office of the Deputy Chief of Staff for R&D, Memorandum for Colonel Schultz, Air Force People in NASA, December 18, 1964, IRIS 1002995, AFHSO, 1.

¹⁶⁹ Samuel Phillips, Report of the Joint Air Force-NASA Military Requirements Review Group, September 1964, folder: 1964, Manned Lunar Landing Program, Personnel, Military, box 43, Samuel Phillips papers, LoC; and Cantwell, *Air Force in Space*, FY65, 13.

ever, the Air Force remained flexible and went out of its way to meet NASA's requests. For instance, in 1965 Dryden and Zuckert worked out an agreement for a wholesale transfer of no less than 128 USAF officers (84 lieutenants, 38 captains, and 6 majors) to NASA to do exactly the kinds of day-to-day operational duties that the letter of the September 1964 memorandum of understanding said they should not perform. It appears this transfer was feasible because the phasing out of several Atlas and Titan ICBM units within the Air Force created a condition of surplus officers with the type of operational skills that NASA needed in its burgeoning Gemini and Apollo programs.¹⁷⁰

The Air Force made one requirement concerning the transfer of these 128 officers crystal clear, however: "Under no circumstances should this action be connected with the proposed MOL program" even though the avowed purpose of their going to NASA was "to receive on-the-job training and experience in the operational control of manned space flights."¹⁷¹ In fact, the Vice Director of the MOL program wrote that the 128 officers were ". . . to receive training in the skills required in the operational control of manned spacecraft for subsequent application to Air Force programs, e.g., MOL."¹⁷²

An overall evaluation of the usefulness of the personnel transfer program to the Air Force in late 1965 revealed USAF reservations. The report concluded, "Benefits to the Air Force accruing from the assignment of nearly 200 officers do not appear to be commensurate with the potential" that existed when the program began. Overall, the results of the program of assigning Air Force personnel to NASA "have not been very encouraging."¹⁷³ Almost a year later the MOL's Vice Director stated, "The Air Force has

¹⁷⁰ See the document collection *Air Force Support of Project Gemini, Inputs from the Major Commands*, 1967, K110.8-50, AFHSO for the actual July 22, 1965 Dryden-Zuckert memorandum of understanding on the 128 officers. The background for it is provided by Cantwell, *Air Force in Space, FY65*, 13 and Boone, *NASA Office of Defense Affairs*, 52.

¹⁷¹ Secretary of the Air Force, Office of, Message to all subordinate commanders and offices, August 13, 1965, IRIS 1003002, AFHSO, 1.

¹⁷² Harry L. Evans, Brigadier General, Vice Director of the MOL Program, Memorandum for the Deputy Chief of Staff for R&D, USAF, MOL Program Utilization of 128 Officers Assigned to NASA, December 6, 1965, IRIS 1003002, AFHSO, 1.

¹⁷³ James E. Miller, Colonel, Director of Program Support, AFSC, Report to the Directorate of NASA Program Support, Deputy Commander for Space, AFSC, USAF, USAF Personnel on Duty with NASA, December 9, 1965, IRIS 1003002, AFHSO, 1, 3.

acceded to many requests from NASA in the past for officers with qualifications critically short within the Air Force. It is questionable whether the Air Force has received a sufficient return on these investments. In many cases the officers so assigned, for one reason or another, have not returned to the Air Force."¹⁷⁴ NASA seemed to sense the growing dissatisfaction within the Air Force. Seamans wrote the Air Force's top personnel officer early in 1967, "We have been very pleased with the AF-NASA detailee program, and believe we could effectively continue it at its present level of activity. However, we recognize that your manpower requirements are not static and have been greatly impacted by the Vietnam situation. With this in mind, we are working toward a reduction in our future requirements for Air Force officers to be assigned to NASA."¹⁷⁵ It will be recalled from statistics presented in chapters 4 and 7 that NASA translated this pledge into action: after peaking at 323 in 1966, the number of military detailees to NASA decreased to 318 in 1967, 317 in 1968 and 268 in 1969 with further decreases thereafter.¹⁷⁶ As an aside, data from 1967 indicated that only a limited number of NASA personnel were assigned to DoD.¹⁷⁷

It is difficult to argue with the assessment of the NASA official who monitored NASA-DoD relations concerning Air Force personnel serving in NASA: "the military detailee program was eminently successful" because the officers were of "inestimable value" to NASA projects.¹⁷⁸ As was true concerning

¹⁷⁴ Harry L. Evans, Vice Director, MOL Program, Memorandum for the Air Force Personnel Director, Personnel Support for NASA, September 10, 1966, IRIS 1003002, AFHSO, 1.

¹⁷⁵ Seamans, Letter to Lieutenant General H. M. Wade, Deputy Chief of Staff for Personnel, USAF, January 4, 1967, folder: Military Personnel Detailed to NASA, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁷⁶ Jane Van Nimmen, Leonard C. Bruno, Robert Rosholt, *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 80ff. 1969 figure from Ihor Gawdiak and Helen Fodor, *NASA Historical Data Book, Volume IV: NASA Resources, 1969-1978*, NASA SP-4012 (Washington, DC: USGPO, 1994), 68. The downward trend continued in the 1970s: in 1970 there were 231 military detailees, in 1971 - 172, in 1972 - 119, in 1973 - 78, in 1975 - 61, and in 1975 - 45. See Gawdiak and Fodor, 68.

¹⁷⁷ AACB, Manned Space Flight Panel, A Survey of Information Exchange Between NASA and DOD Relative to Manned Space Flight Activities, November 16, 1967, folder: Manned Space Flight Panel - AACB, box: Aeronautics and Astronautics Coordinating Board # 1, NHDRC, 8. This document mentioned only two: Dr. Michael Yarymovych serving as MOL Technical Director and Mr. Duncan Collins assigned to the MOL Office of Systems Engineering.

¹⁷⁸ Boone, *NASA Office of Defense Affairs*, 59.

DoD material support to NASA's efforts, DoD personnel provided NASA with managerial talent not available anywhere else but desperately needed during NASA's first decade of existence. Military officers serving in NASA furnished NASA the time required for it to develop internally its own managers and technical experts as part of its overall move toward greater institutional independence.

Support Could Lead to Tension II: Reimbursement

The roots of DoD dissatisfaction with its unreimbursed NASA support expenses went back to the Kennedy administration (see chapter 7 for the specific details of cost accounting, etc.) This area of discontent only continued and crescendoed during the Johnson administration. It was the one NASA-DoD disagreement that was so stubborn that it had to be referred above the Secretary of Defense/NASA Administrator level for arbitration. Both agencies turned to BoB Director Charles Schultze for resolution of the seemingly eternal reimbursement question in 1967.

This dispute tended to focus on the Eastern Test Range at Florida, extending into the Atlantic Ocean. NASA's general position was "... that each agency should be responsible for the management direction and technical operation of its own facilities, and for budgeting and funding for such operations." Reimbursement should be avoided as much as possible. Therefore, since DoD had been assigned responsibility for the national ranges, including ETR, it should budget for and fund their annual operating costs while NASA should be held responsible only for those additional range costs directly attributable to its activities: "It merely adds to administrative and other overhead costs to seek reimbursement. . . . Reimbursement should be restricted to those areas where one agency performs unique or unexpected services for the other, the nature of which precludes normal planning and budgeting for by the supporting agency."¹⁷⁹ On the other hand, McNamara and OSD's position was that some type of cost accounting system could be created that would determine exactly what portions of ETR's resources and time were used by NASA and how much by the DoD; from that point, each agency would be billed accordingly.

¹⁷⁹ R.D. Ginter, Director, Office of Tracking and Data Acquisition, NASA. Memorandum to Deputy Associate Administrator for Defense Affairs, December 10, 1964, folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC, 1, plus attachment.

NASA's reply to this was that any attempt to prorate general operations and maintenance costs "would require a major and costly expansion of Air Force and NASA accounting and auditing groups."¹⁸⁰

On August 25, 1966 McNamara promulgated a revised DoD Directive 5030.18 which made official the policy he had unofficially been trying to implement since at least 1963. It directed across-the-board reimbursement for all NASA support: "It is in the national interest for the Department of Defense, to the extent compatible with its primary mission, to make its resources available on a reimbursable basis, as appropriate, to NASA."¹⁸¹ However, "This reversal of reimbursement policy was not accepted by NASA and a DoD/NASA management group was established to resolve the conflicts."¹⁸² Boone added that McNamara issued this directive "without any prior discussions or coordination with NASA."¹⁸³ DDR&E John S. Foster explained the crux of the problem to McNamara as he urged McNamara to hold firm to his August directive: "The Eastern Test Range is the most complicated and highest-cost example of DOD support to NASA. Although NASA programs received about one-half of the total FY 66 range support, NASA reimbursed only \$27 million of total range costs of about \$250 million. . . . Lack of clear association of non-reimbursed costs with the NASA mission to some extent lessens NASA motivation to minimize requirements for DoD support." Foster added, "NASA maintains that if significant additional reimbursement is requested, NASA must enter into the general management of the range. It is not clear whether NASA actually believes that this would be necessary, or whether they are using this threat to coerce the Defense Department into abandoning plans for increased NASA funding contribution."¹⁸⁴

¹⁸⁰ Seamans, Letter to Schriever, April 12, 1965, folder: NASA/DoD Cooperation/ Documentation, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁸¹ DoD Directive 5030.18 cited by Boone, *NASA Office of Defense Affairs*, 141.

¹⁸² Alfred C. Barree, Lieutenant Colonel, Policy and Plans Group, Directorate of Space, Deputy Chief of Staff for R&D, USAF, Memorandum for the Record, Summary Report - DOD Support of Project Gemini, April 17, 1967, *supra*, 1.

¹⁸³ Boone, *NASA Office of Defense Affairs*, 141.

¹⁸⁴ John S. Foster, Memorandum to the Secretary of Defense, Reimbursement Issues, October 6, 1966, folder: NASA-DoD Correspondence, box: Arnold Levine, Selected Sources from the author, NHDRC, 1, 2, and attachment p. 6.

Whatever the reason for NASA's refusal to pay its way with the DoD, McNamara held firm in his demand that it do so. He wrote Webb on November 2, 1966, "I propose to initiate a policy of full recovery of DoD costs of support to NASA . . . to the maximum extent possible in FY 68 [at ETR], and that all DoD support to NASA, and NASA support to DoD will be on this basis by FY 69."¹⁸⁵ NASA's response continued to be, "If NASA is to significantly increase its contribution to funding of ETR development, operations, and maintenance costs, then NASA should have a commensurate voice in ETR management; and that under the present 'National Range Concept' and present reimbursement policies, NASA does not have a responsibility for, nor a significant voice in developing and justifying [Eastern Test] Range planning and funding."¹⁸⁶ A NASA-DoD special working group under Boone had in fact been discussing this very issue since 1965 without success. They were ordered anew to forge a compromise concerning this Gordian knot of accounting, but to no avail. Boone summarized that he and the DDR&E representative could not even achieve a meeting of the minds on a report summarizing their differences: "It appeared at this point that we could not even agree as to how we should report that we disagreed."¹⁸⁷

Accordingly, in April 1967 Seamans and Foster signed a joint letter referring the whole ETR/reimbursement problem to the BoB for arbitration because "fundamental differences in the views of the two agencies will continue to retard our progress toward agreement."¹⁸⁸ Schultze accepted the task of arbitration and in February 1968 decided: that the DoD would continue to provide management functions at ETR without reimbursement from user agencies such as NASA; that support functions would continue according to present practices in that NASA would pay for only the direct costs it incurred for equipment

¹⁸⁵ McNamara, Letter to Webb, November 2, 1966, folder: NASA-DoD Correspondence, box: Arnold Levine, Selected Sources from the author, NHDRC, 1.

¹⁸⁶ F.B. Bryant, Co-Chairman, NASA Management Working Group, Memorandum to Boone, Management Working Group Report: ETR Reimbursement Study, November 9, 1966, folder: USAF Satellites (General), DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁸⁷ Boone, *NASA Office of Defense Affairs*, 143.

¹⁸⁸ Foster and Seamans, joint letter to Charles Schultze, April 4, 1967, folder: Air Force Eastern Test Range, DoD subseries, Federal Agencies series, NHDRC, 1.

and at facilities with no charges for overhead or administration imposed; but that there would be, however, a prorated division of costs related to operations at the ETR and that NASA should pay 40 percent of these costs, except for the Apollo range instrumentation aircraft, for which NASA would pay for 85 percent. Therefore, whereas under the old system in effect for FY68 NASA had paid only \$25 million for its use of ETR, in FY69 it would have to pay \$51 million; DoD ETR FY69 costs would be \$209 million.¹⁸⁹

Schultze also stated that this entire scheme was only an interim arrangement until a financial management system could be installed at ETR that would fully identify costs based on valid accounting procedures. He also emphasized that these guidelines for ETR did not apply to other areas of cross support (cost of Communications Satellite Corporation launches, Apollo recovery forces, and support services at Western Test Range and the White Sands Missile Range, for example); discussions concerning these other areas had to continue. Boone's interpretation was that, "For FY 1969, at least, the Director of the Bureau of the Budget had accepted essentially the NASA position on ETR funding."¹⁹⁰ Nevertheless, an internal NASA memorandum stated, "As a result, a review of all NASA requirements is under way to reduce these requirements and insure full utilization of NASA facilities wherever possible."¹⁹¹

When NASA and the DoD asked for yet another round of arbitration for FY70, the BoB simply extended in the FY69 guidelines for another year. However, an Air Force historian explains that in 1970, "Air Force officials soon discovered that the reimbursement issue could cut both ways. Hence, it would cost far less for the Air Force to participate in NASA's Space Shuttle development under an additive cost arrangement" which was NASA's interpretation of the reimbursement issue (paying for only the direct costs one agency added to another agency's program by its participation in the program but not for any overhead or administrative costs). Therefore, the reimbursement issue began to fade. A second factor lessening the issue's importance was that as NASA's Apollo program passed its peak funding require-

¹⁸⁹ Boone, *NASA Office of Defense Affairs*, 149-50.

¹⁹⁰ *Ibid.*, 150.

¹⁹¹ R.D. Ginter, Director of Special Programs Office, NASA, Memorandum to the Deputy Associate Administrator for Advanced Research and Technology, October 4, 1968, folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC, 1.

ments stage it required a lower level of Air Force support and so NASA generated a lessened amount of unreimbursed expenses. The specific numbers, in millions of dollars, for Apollo support were:

<u>Year</u>	<u>Total Support</u>	<u>Reimbursed</u>	<u>Non-Reimbursed</u>
1967	244.7	164.7	79.9
1968	160.9	116.2	44.6
1969	175.7	128.2	47.4
1970	125.2	101.7	23.4

In other words, the Air Force was absorbing less than \$25 million dollars in 1970 compared to almost \$80 million in 1967 while simultaneously looking at a potentially expensive involvement in the space shuttle program if it, the Air Force, had to pay for its participation on a strictly reimbursable basis. Given the fact that NASA had already agreed to pay a greater percentage of the operations-related expenses at ETR by 1970, “. . . the full cost issue became a moot point. At least for the moment, the reimbursement level was closed.”¹⁹²

When all was said and done, Arnold S. Levine probably best summarized the complicated NASA-DoD reimbursement controversy when he characterized the whole situation as “hopeless, but not serious.” The whole imbroglio suggested more than anything else that the NASA-DoD relationship had matured to the point where it could survive the strain, even when confronted with a problem that was “not amenable to any simple or permanent solution.”¹⁹³

The Reciprocal: NASA's Contribution to National Security

The respective NASA and OSD perspectives concerning NASA's direct contribution to national security continued to follow the trends outlined in chapter 7. Senior NASA officials regularly averred that the facilities, experience, and technology generated by NASA's human spaceflight program were a direct contribution to national defense because they were a national capability available to all. Webb wrote the Chairman of the JCS at the beginning of Johnson's presidency, “The entire Gemini program and more

¹⁹² All citations and figures this paragraph from Neufeld, *The Air Force in Space, Fiscal Years 1969-1970*, supra, 13-14.

¹⁹³ Levine, *Managing NASA in the Apollo Era*, 213, 237.

than seventy-five percent of the Apollo program are devoted to developing a national capability to conduct extended operations in near earth orbit, including the development of operational techniques for rendezvous, docking, and maneuvers in space." Webb said these capabilities were "... applicable to all regimes of manned space flight, and therefore should be included in any study of the contribution which the NASA program makes to military objectives in space."¹⁹⁴ As NASA's Office of Defense Affairs often stated, "NASA is acutely conscious of the need to render maximum support to the Department of Defense. It is a primary policy of NASA to assist the DOD in every way possible to meet its needs in the use of space for national security. . . . We estimate that 75 percent of the cost of the Apollo program will be devoted to the development of a capability for conducting near earth orbit operations, an essential basis for the development of any manned space weapon system."¹⁹⁵

Webb and the rest of the NASA leadership took care not to clarify this conclusion or give it much publicity because of its potential international implications on NASA's worldwide tracking stations. For instance, while NASA was negotiating with Madagascar to augment its facilities there, President Tsiranana "... revealed sensitivity to any possible military implications of the station. He expressed a desire to avoid publicity abroad concerning the station."¹⁹⁶ Therefore, NASA officials had a delicate balancing act in which they tried to partially justify NASA's expenditures because of their military relevance, yet had to deny this relevance to secure or maintain access to some foreign countries. This meant Webb and the others rarely clarified exactly what they had in mind when they stated NASA's experience and hardware were applicable to national security; they simply maintained NASA's capabilities were relevant.

¹⁹⁴ Webb, Letter to General Maxwell Taylor, January 16, 1964, folder: DOD Joint Chiefs of Staff, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁹⁵ NASA, Office of Defense Affairs, Report, The Use of the National Space Capability in Military Affairs, July 3, 1964, extracted in Boone, *NASA Office of Defense Affairs*, 312-13.

¹⁹⁶ Richard Callaghan, Special Assistant to the Administrator, NASA, Memorandum to William Moyers, Assistant to the President, May 12, 1964, folder: Daily Reports to the White House, box: White House, NASA Reports to the White House, NHDRC, 1.

Thus it tended to be only in military forums that Webb declared. "The future of man in space cannot yet be distinguished from his possible military value there. Even purely scientific inquiries into the nature of the space environment will be necessary for the employment of any military systems in space We have no choice but to acquire a broadly-based total capability in space - a capability that can enable us to insure that protection of our national security while we actively seek cooperative peaceful development of the scientific and practical resources of space."¹⁹⁷ In internal reports NASA stated its entire complex of unique facilities constructed by the Army Corps of Engineers and the Navy Bureau of Yards and Docks at a cost of a billion dollars ". . . is available to the Department of Defense to meet whatever requirements it may have in the future for manned space systems;" the facilities could support "defense measures in space if required" and served collectively as "a national resource of substantial value to the military." Therefore in a general sense, NASA made available ". . . an expanding flow of new scientific knowledge and more advanced technology for use in the development of weapon systems of ever-increasing effectiveness . . . which will give our nation the capability to insure that space cannot be used by a hostile power to gain a military advantage over us."¹⁹⁸

As NASA's budgets began to decline from 1965 on, Webb did not hesitate to regularly point out to Congress the military relevance of NASA's R&D. In April 1966 he maintained, "Every airplane in Vietnam today is a better airplane because of the work in NASA. . . . The missiles that we have as a major part of our deterrent force all have benefited, including the largest one in the military service, from the work which comes from our research and development program." Webb added that one of NASA's priority areas was developing the ". . . technology and operational capability from the surface of the Earth outward through the air and outward in the immediate environment of the Earth. This capability has a

¹⁹⁷ Webb, Speech to the U.S. Naval Academy, April 8, 1965, folder: Speech File I, February 23 - April 8, 1965, box 220, James Webb papers, HSTL, 14-15.

¹⁹⁸ NASA, Office of Defense Affairs, Report, "NASA's Contributions to National Security, November 8, 1965, folder: NASA's Contributions to National Security, DoD subseries, Federal Agencies series, NHDRC, 1, 16-17, 19.

direct bearing on our military capability.”¹⁹⁹ Webb wrote to Senator Everett Dirksen in August 1966 to oppose the proposed cuts in NASA’s FY67 budget, stating they would make it difficult for NASA to develop the space technology necessary “to make sure we do not wake up some day and find others in possession of the power to deny us the use of space.”²⁰⁰ As mentioned above, however, Webb did not clarify these general statements with specific examples of exactly to what he was referring.

It will be recalled from chapter 7 that McNamara was not overly impressed with NASA’s claims of the direct relevance of its work to national security; at one point he determined that only \$600-\$675 million of NASA’s requested FY64 budget of \$5.7 billion was in fact the kind of R&D activity the DoD would undertake if NASA did not. This general OSD assessment continued throughout the Johnson administration; there is no need to belabor it here. What was true during Kennedy’s tenure, moreover, remained true during Johnson’s: the DoD evidently did not feel strongly enough about the matter to expend much time or energy in publicly refuting Webb’s claims or those of other NASA leaders concerning the potential military utility of NASA R&D, facilities, and experience. DDR&E Brown testified to the Senate space committee in 1965 that if NASA was not conducting its \$5 billion dollar annual program that the DoD might have to spend “hundreds of millions a year” or perhaps even “\$1 billion a year to develop that technology.” McNamara also remarked in 1965 that the Apollo program had “no direct military worth.”²⁰¹

A four volume, 600-page April 1964 Air Force assessment of the lunar landing program concluded,

With the exception of Gemini . . . no system or subsystem in the National Lunar Program is directly applicable to established military requirements. There are a number of techniques being explored and experience being acquired in the National Lunar Program which are applicable to military requirements and interests in both the midrange and long-range time periods. Unique military needs, however are not covered in the NASA program. The most significant military benefit of the National

¹⁹⁹ Congress, House, Committee on Appropriations, Subcommittee on Independent Offices, *Independent Offices Appropriations for 1967*, Hearings, Part 2. 89th Congress, 2nd Session, 1966, p. 1417-18.

²⁰⁰ Webb, Letter to Everett Dirksen, August 9, 1966. *Exploring the Unknown, Volume I*, 492.

²⁰¹ Both men cited in H.L. Nieburg, *In the Name of Science* (Chicago: Quadrangle Books, 1966). 31.

Lunar Program is the overall contribution to the advancement of space technology.²⁰²

An Air Force document from mid-1967 stated, "The value of past and current USAF/NASA association is most difficult to quantify. The primary value is new technology, which will not have an impact on operations for a considerable time. . . . At present, there is no way to extrapolate from current NASA efforts to determine future value to the Air Force."²⁰³ At best, the military community was ambivalent about the direct relevance of NASA's work.

NASA and Its Vietnam Support Effort

One area in which NASA did make a direct and concretely identifiable support effort for the DoD was in adapting and originating technology for the DoD's use in Vietnam and Southeast Asia. In December 1965 NASA created a special Limited Warfare Committee "to coordinate the overall NASA effort to support the Military Services in Southeast Asia."²⁰⁴ By the end of 1966 Webb wrote the AF's top officer: "We have had a modest effort underway for a year now, aimed at applying space derived technology or techniques to the solution of some of these problems [in Vietnam], and we have two or three projects which are about ready to be turned over to the Services at this time."²⁰⁵ Seamans reported to DDR&E Foster that concerning the ". . . application of NASA's competence, capabilities, and resources to the problems you are facing in Southeast Asia . . . we are most pleased to have the opportunity to assist in these difficult matters." Seamans reported NASA was currently working on numerous projects for eventual DoD use such as: Reflector Satellite; Quiet Aircraft; Target Marker; Counter Mortar system; Am-

²⁰² USAF, *Study Pertaining to the National Lunar Program, Volume I: Summary Report*, April 1964, IRIS 880570, AFHSO as well as K140.22-2, AFHRA, 6. Declassified at author's request by the Joint Staff, December 30, 1996.

²⁰³ USAF, Headquarters, *History of the Directorate of Space, Deputy Chief of Staff for Research and Development: January - June 1967, July 1967*, K140.01-1, AFHSO, 13.

²⁰⁴ W. Fred Boone, Deputy Associate Administrator for Defense Affairs, Memorandum for Mr. Hilburn, AAD, Special Support to Military Services re War in Southeast Asia, December 7, 1965, folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC, 1.

²⁰⁵ Webb, Letter to John F. McConnell, Chief of Staff of the Air Force, December 29, 1966, folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC, 1.

bush Detection System; Passive Communications Satellite; and new battery systems.²⁰⁶ Boone reported NASA's efforts by the end of 1966 were budgeted at about \$4 million a year and occupied 65 scientists and engineers.²⁰⁷

By the middle of 1967 Seamans considered two of NASA's projects in this field as major: an effort to improve the use of white phosphorous as a target marker; and an attempt to develop an acoustic mortar locator. Seamans estimated NASA's FY68 expenses for its Southeast Asian support effort at \$3.7 million. This figure included not only the two major projects but exploration into many other possibilities such as: tunnel destruction; ambush detection; and a napalm cannon.²⁰⁸ In December 1967, however, NASA's support for DoD's war effort in Vietnam leaked to the press. The *Washington Post* reported NASA's Office of Advanced Research and Technology was spending between \$4-\$5 million per year directing 100 scientists and engineers on tasks "vital to the Vietnam war." The *Post* quoted an unnamed NASA official: "I don't think anybody is so naive that he might feel an agency spending \$4 billion a year on technology shouldn't spend some of it trying to win a war we're fighting."²⁰⁹

It is doubtful NASA welcomed this type of publicity, but its effort to support the war in Vietnam continued. Boone stated that NASA personnel eventually considered 89 specific problem areas for the DoD relating to the Vietnam war.²¹⁰ For instance, a NASA document from 1969 revealed, "This agency is studying the development of a surveillance system for helicopter patrol of urban areas" in Southeast Asia.²¹¹ Another 1969 NASA document listed numerous contributions to the United States forces in

²⁰⁶ Seamans, Letter to Foster, November 22, 1966, folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC, 1.

²⁰⁷ Boone, *NASA Office of Defense Affairs*, 250.

²⁰⁸ Seamans, Letter to Foster, July 17, 1967, folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC, 1-3.

²⁰⁹ Thomas O'Toole, "NASA's Role in War Grows," *Washington Post*, December 4, 1967, 4F.

²¹⁰ Boone, *NASA Office of Defense Affairs*, 251.

²¹¹ R.D. Ginter, Acting Director, Defense Projects Support Office, Special Programs Office, NASA, Memorandum to the Commanding General, Headquarters, Army Materiel Command, April 24, 1969, folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC, 1.

Vietnam, to include: \$3 million worth of computer technology, highlighted by the sound-location system for detection of mortars; electronics such as a small device to locate a survival radio when separated from a downed pilot; fire suppressant foam to reduce airplane hazards; and a target marker rocket.²¹² Given the lack of documentation surviving from this effort after 1969, however, Arnold Levine's conclusion that it was phased out in 1969 seems correct.²¹³ Given that fact that a \$4 million annual effort in a budget of \$5 billion represents less than one-tenth of one percent of NASA's total funding, its Vietnam war effort was not a major factor in the NASA-DoD relationship. However, it is one of the few concrete areas that existed in which NASA tangibly supported the DoD.

Space policy as well as the NASA-DoD relationship during the Johnson presidency were both marked by elements of continuity with his predecessor. Johnson remained committed to the competitive dynamic within the Apollo drive for the moon but not so committed that he could be persuaded to endorse any large space projects to follow it. As one Johnson scholar summarized, "Johnson never abandoned his determination to beat the Russians to the moon, but the course of events, especially the Vietnam War, forced him to impose some very real limits on the American effort in space."²¹⁴ Logsdon concurred: "Lyndon Johnson may have believed in the importance of space leadership, but he found himself unable to allocate to the space program the resources required to sustain that leadership once America reached the Moon. His support for space is unlikely to be recorded as one of the highlights of Lyndon Johnson's years in the White House." After all, by the time Johnson left office, NASA's budget had declined from its peak of \$5.2 billion to less than \$4 billion.²¹⁵ Levine added, "Once NASA began to lose the support of the

²¹² R.D. Ginter, Memorandum to NASA Assistant Administrator for International Affairs, June 24, 1969, folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC, 1, plus attachment.

²¹³ Levine, *Managing NASA in the Apollo Era*, 230.

²¹⁴ Divine, "The Politics of Space," *supra*, 233.

²¹⁵ John Logsdon, "National Leadership and Presidential Power," chapter 7 in the forthcoming Roger D. Launius, editor, *The Myth of Presidential Leadership* (Urbana, IL: University of Illinois Press), 381 in manuscript copy provided to author.

White House and Congress - roughly from 1967 - the difficulty of running the agency became greater and NASA began to resemble any other large government organization which redoubles its efforts as it forgets its aim."²¹⁶

Support, coordination, and rivalry continued to characterize the relationship between NASA and the DoD although NASA's institutional independence continued to grow throughout the 1960s and any tension remaining between the two organizations seemed to be confined to questions of exactly how much DoD would support NASA in the sense of transferring personnel and receiving financial reimbursement for services rendered. As an Air Force source noted in mid-1968, the first ten years of NASA's existence "... has been a build-up phase acquiring talent and facilities needed to support their activities. This build-up has been essentially completed, and they have an impressive array of engineering and scientific manpower, facilities, and experience in space development and operations." In addition to the smoothly functioning formal relationship between the two organizations, "a fine informal relationship exists between the agencies."²¹⁷ It was only natural that NASA's dependence on the DoD had waned simultaneously with the growth of its internal capabilities.

Shortly before he resigned as Secretary of Defense, McNamara remarked, "A whole network of formal and informal channels has been established with the National Aeronautics and Space Administration . . . to ensure the maximum interchange of men, ideas, technology and hardware. . . . In every case, I have insisted that the space projects undertaken by the Defense Department must hold the distinct promise of enhancing our military power and effectiveness, and that they mesh in all vital areas with those undertaken by NASA, so that, together, they constitute a single fully integrated national program."²¹⁸ Given

²¹⁶ Arnold S. Levine, "Management of Large-Scale Technology," in Alex Roland, editor, *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405 (Washington, DC: USGPO, 1985), 48

²¹⁷ USAF, Headquarters, *History of the Directorate of Space, Deputy Chief of Staff for Research and Development: January - June 1968*, July 1968, K140.01-1, AFHSO, 8.

²¹⁸ McNamara, Statement on the 1969 Defense Program, January 22, 1968, in George C. Herring, General Editor, *Lyndon B. Johnson National Security Files, Agency File, 1963 - 1969*, microfilmed from the holdings of the Lyndon B. Johnson Library, Robert E. Lester, Project Coordinator (Bethesda, MD: University Publications of America, 1993), reel 11, p. 161.

the close supervision McNamara exercised over Air Force space proposals, there is little likelihood the fundamental balance of support, coordination, and rivalry existing between NASA and the DoD could have been significantly altered, even if the Air Force had wanted to do so. As former DDR&E and then Secretary of the Air Force Harold Brown emphasized concerning the Air Force in space, "These programs must be mature and well thought out. We should not be doing things just to be doing them. Rather, they must have a direct relation to established military needs. Space is not a mission, but a place to perform a mission. When a mission can best be performed from space, the Air Force will perform it from there."²¹⁹ The story of the next chapter will largely focus on how the Air Force attempted to justify the MOL within that framework and the impact of NASA's Apollo Applications Program on that process.

²¹⁹ "Air Force Secretary Brown: Tactical Air Power, A Vital Element in the Application of Military Forces," an interview with Secretary of the Air Force Harold Brown, *Armed Forces Management* (October 1966): 69.

10. Programmatic Resolution: Apollo and MOL

The history of the Air Force efforts to get a man in space is a spectacularly frustrating one. For various reasons, the Air Force was long denied the opportunity to try. When permission was finally begrudgedly given, delays and quibbles and fund-withholdings still were encountered. The program is not out of the woods yet. NASA, at the highest level, took a most statesmanlike position vis-à-vis the MOL.¹

Any militarily useful manned space system must be a careful match between man, special abilities, automatic equipment on board the spacecraft and on the ground, and the mission. . . . Manned space flight undertakings will be expensive, and the payloads which man will accompany into orbit must justify his presence in the man-machine loop in orbit if the manned system is to be cost competitive. . . . The value of the mission clearly must rest on the necessary presence of man in the satellite.²

The main thrust of this chapter will be to examine the development and ultimate cancellation of the Air Force's Manned Orbiting Laboratory, the USAF's last, best hope for an independent human spaceflight program. However, the fate of the MOL cannot be analyzed in isolation because its cancellation was closely tied to factors both within the DoD and external to it. One of the factors was a perception that MOL duplicated the reconnaissance capabilities of the NRO's robotic reconnaissance satellites; therefore, one must briefly look at the question of reconnaissance satellites in the Johnson administration. Another factor in the MOL's cancellation was the conclusion by some that MOL duplicated NASA's Apollo Applications Program (AAP) because they were both basically early versions of space stations; therefore, one must look at the relevant portions of the AAP story inasmuch as they impacted on MOL. It is hoped that this strategy of tying in all the relevant inputs to MOL's cancellation will complete the picture of the NASA-DoD relationship in the 1960s.

¹ C.P. Cabell, General, USAF, Retired, Consultant to the NASA Administrator, Memorandum to Leonard Jaffee, Director, Space Applications Programs, Subject: Remote Sensors for Earth Oriented Purposes, June 21, 1968, folder: Resolution from Space, DoD subseries, Federal Agencies series, NHDRC, 4.

² Albert G. Hall, Deputy DDR&E for Space, Speech, The Military Space Program, 1965-1975, July 29, 1965, reprinted and issued as DOD News Release No. 488-65, Albert Hall file, Biographical Series, NHDRC, 9-10. Emphasis in original.

Preliminary and Background Information

DoD Experiments on Gemini

Chapter 8 described how, after his failed attempt to gain management control over NASA's Gemini program, McNamara signed in January 1963 a NASA-DoD agreement which included provision for the DoD to conduct experiments on NASA Gemini flights. These experiments serve as a sort of introduction to the main MOL story because they highlight the underlying reason the OSD and Air Force felt the military needed to determine if officers had a role in space: reconnaissance. While public discussion and rhetoric continued to characterize MOL as an experimental test bed, the reality was that throughout the Gemini experimental program the quest for data on exactly what, if anything, humans could contribute to the process of gathering overhead reconnaissance was paramount in the military space program. As Assistant Secretary of the Air Force for R&D Alexander Flax wrote DDR&E Harold Brown two months after McNamara approved the concept of an MOL, "It is believed that the experience gained in the Gemini experiments will be of considerable value for the MOL program."³

By the spring of 1964 NASA and DoD had jointly selected a total of 23 experiments for the Gemini flights, ten of which were reserved for the DoD. NASA carefully described some of the more sensitive DoD experiments. For instance, one was titled "Visual Definition of Objects" which NASA defined as the "exploration of the technical problem areas associated with man's use of visual and optical equipment during space flight. Commercially available photo/optical equipment will be integrated into the Gemini spacecraft in a manner allowing the astronaut to view and photograph selected objects." Another DoD experiment was "Visual Definition of Terrestrial Features," which NASA said was for the "optical and photographic observation of terrain features to compare what man says he can see to that verified by photographs." A third was "Astronaut Visibility" to "precisely determine man's capability to see Earth's objects clearly. Calculations which can be made need to be checked before man's visual discrimination capabilities can be ascertained. A simple optical system will be operated by the astronaut in making visual observations." Of course not every single DoD experiment aboard Gemini dealt with re-

³ Alexander H. Flax, Memorandum to Harold Brown, Manned Orbital Program, January 18, 1964, IRIS 1002995, AFHSO, 3.

connaissance. Several were oriented toward the satellite inspection mission such as "Visual Definition of Objects in Near Proximity in Space" designed to "demonstrate human proficiency and functional capability in space while maneuvering. The astronaut will maneuver his spacecraft so as to visually observe nearby objects in space from various aspects."⁴

When the trade press translated NASA's generic descriptions of the DoD experiments, it was much clearer: "The Air Force has restricted its experiments to those it considers vital to the Manned Orbiting Laboratory prelude where a military crew will be charged with the responsibility of spying and inspecting from his space platform. . . . The DoD experiments are obvious - the determination of the feasibility of operating a reconnaissance and spying system from a manned platform in space." It should also be noted that among the strictly NASA Gemini experiments there were also several that seemed to support the DoD's desire for gathering information on the role of humans in collecting intelligence from space. For instance, three of NASA's experiments were titled "Visual Definition of Terrestrial Features," and "Synoptic Terrain Photography," and "Visual Acuity in Space," and carried descriptions similar to the DoD reconnaissance-related experiments.⁵

Internal Air Force documents also summarized, "Experiments have been chosen to make maximum contribution toward the objectives of satellite inspection and observation from spacecraft" with an emphasis on "investigat[ing] man's ability to discriminate, acquire, track and photograph preselected orbital and terrestrial objects from Gemini."⁶ Flax told Secretary of the Air Force Zuckert: "The Air Force experiments have been chosen to provide maximum contribution toward objectives of satellite inspection and for observation. These are rudimentary experiments which will contribute to later programs such as the Manned Orbiting Laboratory. It is reasonable for this interpretation to be drawn from unclassified test

⁴ NASA, News Release No. 64-78, NASA Selects Gemini Experiments, April 15, 1964, folder: DOD/USAF "Blue Gemini," DoD subseries, Federal Agencies series, NHDRC, 6-9.

⁵ "Gemini NASA/DOD Piggy-Back Experiments," *Space Daily* (April 17, 1964): 102. This list of experiments also contained in William Gregory, "DOD, NASA Agree on Gemini Experiments," *Aviation Week and Space Technology* (June 1, 1964): 42.

⁶ Robert E. Adair, Major, USAF, Office of the Deputy Chief of Staff for R&D, *History of the Assistant for Manned Orbiting Laboratory: 1 January 1964 through 30 June 1964*, July 1964, IRIS 1002993, AFHSO, 5.

descriptions. Reconnaissance and inspection, however, have not been publicized.”⁷ Although one must mention the DoD’s Gemini experiments program, one must also not make too much of it. In the words of the Air Force: “Due to physical space limitations, our Gemini experiments must be of a rather basic nature.” As such, the Gemini experiments were “. . . a first minimal effort toward the development of a reservoir of manned military space experience. However, our participation in this limited way in NASA’s Gemini program falls far short of satisfying our requirements. We cannot gain the experience which we require to build a firm foundation for a manned military space program by looking over the shoulders of the people who are designing, conducting, and managing space programs.” The MOL was therefore “our calculated program which offers the best promise of military preparedness for any space eventuality.”⁸

The peak of the DoD Gemini experiments program was probably on the Gemini V flight, August 20-29, 1965. On it the following DoD experiments were conducted: Basic Object Photography; Celestial Radiometry/Space Object Radiometry; Surface Photography; and Astronaut Visibility. Also scheduled was Nearby Object Photography but it had to be canceled because rendezvous with the target vehicle was not accomplished. In addition, NASA conducted its experiments of Synoptic Terrain Photography and Visual Acuity. NASA’s official report for this flight indicated concerning basic object photography that “acquiring, tracking, and photographing celestial bodies present no problems.” The radiometric experiments (designed to detect and measure energy emitted from various non-natural sources such as ICBMs) was successful: “Visual observation of the rocket plumes was possible in all cases.” The Surface Photography experiment used enhanced but commercially available cameras to photograph the earth from space and “Results obtained indicate that visual acquisition with visual tracking can be successfully applied to obtain photographs of a preselected terrestrial object.” NASA commented on its own synoptic terrain photography: “Ground resolution is remarkably high: many small roads, canals, pipelines, and similar

⁷ Alexander Flax, Memorandum to Eugene Zuckert, August 17, 1964, IRIS 1002994, AFHSO, 1. Emphasis in original.

⁸ USAF, Office of the Deputy Chief of Staff for Research and Development, Assistant for Manned Orbiting Laboratory (AFRMO). Unclassified Supporting Witness Statement, Manned Space Programs, March 9, 1965, IRIS 1002996, AFHSO, p. 3-4.

features are clearly visible.”⁹ The astronauts conducted the photographic experiments on Gemini V using a modified Hasselblad camera and telephoto lenses with 10” and 48” focal lengths; photographs of downtown Dallas “clearly showed the individual runways, taxi-strips, and buildings of Love Field.”¹⁰ Perhaps it was entirely coincidental that in August 1965 President Johnson also give his approval for the Air Force to proceed with construction of the MOL, perhaps not.

NASA overall reported encouraging results from its and DoD’s experiments relating to the human ability to conduct photographic reconnaissance from space. This must have been heartening to supporters of the MOL program. However, when these reconnaissance-related experiments were openly discussed by the press,¹¹ Vice President and NASC Chairman Hubert Humphrey was not pleased. He wrote Webb, “I was disturbed and concerned about the attached news story [cited above]. . . . I was under the impression that all of this reconnaissance activity was top secret. If I am in error, I would like to be so informed. You may want to look into this, and I do hope so.”¹² While this author discovered no reply from Webb to the vice president, there was a trailing off of publicly-released information about the DoD experiments aboard NASA Gemini flights until the program’s termination a little over a year later.

The Air Force’s evaluation of the Gemini experiments program was positive.¹³ One of its reconnaissance- and observation-related conclusions stated, “Astronaut capability to acquire, track and photo-

⁹ NASA, Manned Spacecraft Center, *Gemini Program Mission Support: Gemini V*, August 1965, box: Gemini Program, GT4 & GT5, shelf VII-A-4, NHDRC, 8-2, 8-5, 8-7, 8-10, 8-41.

¹⁰ Roy Houchin, “Interagency Rivalry?” *Quest: The History of Spaceflight Magazine* 4 (Winter 1995): 38.

¹¹ See Harold M. Schmeck, “Man’s Role in Space Underlined as Astronauts Sight Missile Shot,” *New York Times*, August 25, 1965, p. 1; and William Hines, “Gemini Flight Slated to Carry Sky-Spy Gear,” *Washington Evening Star*, August 15, 1965.

¹² Hubert Humphrey, Memorandum to Webb, August 21, 1965, folder: Space Surveillance, DoD subseries, Federal Agencies series, NHDRC, 1.

¹³ The final tally of DoD experiments scheduled for Gemini was fifteen; overall, 52 experiments were conducted on Gemini missions. The experiments, and their official results, were: Basic object photography, successful; Nearby object photography, not performed; Mass determination, once not performed, once successful; Celestial Radiometry, twice successful; Star occultation navigation, once not performed, once successful; Surface photography, successful; Space object radiometry, twice successful; Radiation in spacecraft, twice successful; Simple navigation, once not performed, once successful; Ion-sensing attitude control, twice successful; Astronaut maneuvering unit, experiment only partially performed; Astronaut visibility, once not performed, once successful; UHF-VHF polarization, once not per-

graph predetermined objects in space was confirmed." Concerning the photographic definition of terrestrial features, "The ability of an astronaut to acquire, track and photograph predetermined ground targets with equipment having a narrow field of view was clearly demonstrated. Information was developed on requirements and procedures for accomplishing manned spacecraft photography." The Air Force's astronaut visibility experiment on Gemini "confirmed techniques for predicting the capability of astronauts to discriminate small objects on the surface of the earth in daylight." The Air Force was troubled by its inability to classify its reconnaissance-related activities in the Gemini program, however, due to NASA's insistence on an open information policy: "With complete exposure of the DOD experiments certain aspects such as photography, low light level television, and radiometric measurements which inherently convey implications of intelligence objectives, became especially troublesome. The concern for public impression on these subjects eventually caused curtailment of activities in these areas and resulted in limitation of experiment technical product." In the end, however, the Air Force concluded the Gemini experiment effort "has been worthwhile. Valuable technical information and experience has been acquired at relatively low Air Force cost . . . which will be valuable in obtaining information and support for the MOL program." ¹⁴ The overall cost of the experiments program was \$28.5 million. ¹⁵ Still on file today in the NASA History Office are photographs taken of ETR during the Gemini V flights in which launch pads, roads, towns, and causeways are clearly visible. ¹⁶

There was no equivalent follow-on program for the Gemini experiments aboard Apollo. This was due primarily of course to the fact that the Air Force had the MOL program in which to conduct in-

formed, once only partially performed; Night image intensification, once not performed, once successful; Power tool evaluation, not performed. In addition, NASA Gemini experiments included: Synoptic terrain photography, successfully performed seven times; Synoptic weather photography, successfully performed seven times; and Visual Acuity, successfully performed twice. See Linda Neumann Ezell, *NASA Historical Data Book Volume II: Programs and Projects 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 169-70.

¹⁴ USAF, AFSC, Space Systems Division, Detachment 2, at NASA Manned Spacecraft Center, Report: Preliminary Evaluation - Program 631A, DOD/NASA Gemini Experiments, September 13, 1966, IRIS 1002997, AFHSO, 14, 17, 20, 23, Appendix X.

¹⁵ USAF, *History of the Directorate of Space*, Deputy Chief of Staff for Research and Development: January - June 1967, July 1967, K140.01-1, AFHSO, 10.

¹⁶ See folder: Space Surveillance Photographs, DoD subseries, Federal Agencies series, NHDR.

vestigations of the military applications of human spaceflight and therefore did not need to "piggy back" on NASA missions. In addition, except for Apollo 7 and 9, there was little time spent in Earth orbit during Apollo missions. After an exchange of correspondence over 1964, the DoD and NASA did agree in March 1965 to continue on board Apollo some of the non-reconnaissance related work that the DoD had done on Gemini in the areas of radiation measurements, manual autonomous navigation, and carbon dioxide reduction.¹⁷ However, after the fire tragedy in January 1967 delayed Apollo's flight test schedule, Seamans recounted that NASA's leadership decided to include in Apollo earth orbital flights only those experiments relating directly to the lunar landing. Therefore, this left the DoD's Apollo experiments without a spacecraft assignment and in June 1967 all three DoD experiments were officially deleted from Apollo flights.¹⁸

Reconnaissance Satellites in the Mid- to Late-1960s

The reader will recall from chapters 5 and 8 that this dissertation has briefly touched on the situation with reconnaissance satellites and the NRO during the Eisenhower and Kennedy administrations. Discussion of this topic during the Johnson era must rely almost wholly on secondary sources, due to the continuing secrecy surrounding space reconnaissance methods and systems. The relevant point from the secondary sources one should apply to this chapter's MOL discussion is simply that as automated reconnaissance satellites became increasingly capable, developed a proven track record of performance, and became key players in arms control and disarmament verification, the MOL's justification as another reconnaissance platform became increasingly difficult to maintain. In the end, it appears that the purported capabilities of the MOL above and beyond those of robotic satellites were not sufficient to convince high-level space policy makers that the MOL was worth its cost.

Perhaps one of the most famous declarations concerning space reconnaissance is from the Johnson administration. It survives only because Johnson believed he was speaking off the record to a group of

¹⁷ Alexander Flax, Memorandum to the DDR&E, Air Force Experiments on Apollo Flights, March 29, 1965, IRIS 1002996, AFHSO, 1.

¹⁸ Gerald T. Cantwell, *The Air Force in Space, Fiscal Year 1967, Part I* (Washington, DC: Air Force History Office, 1969), 22.

educators and government officials in Nashville, Tennessee, but apparently was not. He said in March 1967.

I wouldn't want to be quoted on this but we've spent 35 or 40 billion dollars on the space program. And if nothing else had come of it except the knowledge we've gained from space photography, it would be worth 10 times what the whole program cost. Because tonight we know how many missiles the enemy has and, it turned out, our guesses were way off. We were doing things we didn't need to do. We were building things we didn't need to build. We were harboring fears we didn't need to harbor.¹⁹

This enthusiastic presidential endorsement of space reconnaissance, and indirectly the unmanned satellites of the NRO, gives some indication of the importance of these space assets by the end of the 1960s. While the MOL was designed to be part of the general family of reconnaissance-gathering systems, it would encounter difficulties in cost-effectively adding anything to what the robotic satellites were already doing.

The only primary source document readily available concerning the NRO in the Johnson administration is DoD Directive 5105.23, "National Reconnaissance Office," March 27, 1964. It was apparently the end product of the intra-NRO squabbling between the Air Force and the CIA outlined in chapter 8. This directive stated the NRO was "an operating agency of the Department of Defense, under the direction and supervision of the Secretary of Defense." It was responsible for "consolidation of all Department of Defense satellite and air vehicle overflight projects for intelligence into a single program . . . and for the complete management and conduct of this Program in accordance with policy guidance and decisions of the Secretary of Defense." By 1964, the blackout of information on the satellite reconnaissance program was complete: "All communications pertaining to matters under the National Reconnaissance Program will be subject to special systems of security control. . . . with the single exception of this directive, no mention will be made of the . . . National Reconnaissance Program [or] National Reconnaissance Office. Where absolutely necessary to refer to the National Reconnaissance Program in communications

¹⁹ Evert Clark, "Satellite Spying Cited by Johnson," *New York Times*, March 17, 1967, p. 13. Also in the *Washington Post* of March 18, 1967. Official, on-the-record acknowledgment of United States reconnaissance satellites did not come until President James E. Carter declared at the Kennedy Space Center on October 1, 1978: "Photographic reconnaissance satellites have become an important stabilizing factor in world affairs in the monitoring of arms control agreements. They make an immense contribution to the security of all nations. We shall continue to develop them." *Public Papers of the President, 1978*, volume 2, (Washington, DC: USGPO, 1979), 1686.

not under the prescribed special security systems, such reference will be made by use of the terminology: 'Matters under the purview of DoD TS-5105.23.'"²⁰ Beyond this single document, all other statements concerning the NRO and reconnaissance satellites from the Johnson era are from secondary sources and thus by definition have an element of speculation and conjecture.

Perhaps the only facet of the NRO and reconnaissance satellites as breathtaking as the security procedures surrounding them were the claims concerning the satellites' capabilities by the end of the 1960s or at least the capabilities under development in the late 1960s which debuted in the early 1970s. These capabilities would of course have been the ones against which the MOL was indirectly competing as the Air Force struggled to justify its continued funding in the late 1960s. Philip Klass claimed in 1970 that "... current designs have cloud-cover sensors to prevent them from wasting film on targets obscured by weather, a valuable feature not found on the first photographic satellites. Still more advanced designs in the future are expected to provide real-time photographic and electromagnetic reconnaissance."²¹ Two years later Klass described the nation's newest reconnaissance satellites, often referred to as KH-9 or "Big Bird" as "nearing full operational status," delivering photographs with "fantastic resolution" with "resolution approximately twice that of previous designs, provid[ing] discrimination of individual persons from an altitude of more than 100 miles. Big Bird is designed to perform both the search-and-find and the close-look type missions that have required two different spacecraft." Given the fact that Klass stated the first Big Bird was orbited on June 15, 1971,²² the system clearly would have been in development

²⁰ DoD, Department of Defense Directive 5105.23, National Reconnaissance Office, March 27, 1964, in John M. Logsdon, with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407 (Washington, DC: USGPO, 1995), 373-75.

²¹ Philip J. Klass, "Military Satellites Gain Vital Data," *Aviation Week and Space Technology* (September 15, 1970): 55. "Real-time" is a term meant to describe a process whereby the reconnaissance images are transmitted to ground stations virtually simultaneously, or with very minimal delay, and are shortly thereafter made available to national policy makers. In 1970 the traditional method of data return continued in operation: dropping the film inside canisters back to the surface of the earth to be recovered, processed, and delivered to decision makers.

²² All Klass citations in this paragraph from Philip Klass, "Big Bird Nears Full Operational Status," *Aviation Week and Space Technology* (September 25, 1972): 17.

during the mid- to late 1960s simultaneously with the MOL and presented MOL with a formidable competitor in the space reconnaissance collection mission field.

Jeffrey Richelson concluded that the KH-9 was initially developed as a back-up to the MOL and then in fact did become the nation's primary system when MOL was canceled in June 1969. The KH-9 satellite supposedly weighed 30,000 pounds, measured fifty by ten feet and featured not only conventional photographic cameras, but also infra-red and other multispectral systems.²³ Richelson calculated that the KH-9 had two cameras with sixty inch lenses that produced 24-inch resolution over an 80 by 360 mile swath of territory and carried four film canisters instead of two.²⁴ Another analyst stated that by 1972, ". . .military reconnaissance satellites in the Keyhole series had resolutions on the order of three inches."²⁵ If those descriptions were even partially true, the MOL faced a formidable competitor from the NRO, especially considering the extra weight and expense of the MOL generated by the life support equipment necessary to support humans in orbit.

The exact nature of the competition between the MOL and the NRO's robotic satellites, and how this rivalry may have contributed to MOL's ultimate cancellation, will not be known until the NRO declassifies its historical documents. However, a more general point about the fundamental importance of reconnaissance satellites to national security and geopolitical stability seems certain. It may be an exaggeration to declare, "In simplest terms, there is strong reason for believing that observation from space is *the* most significant development in man's experience."²⁶ Nonetheless, even the soberest assessments make clear that, "The NRO produced, according to some estimates, nearly 90 percent of all intelligence

²³ Jeffrey Richelson, "The Keyhole Satellite Program," *The Journal of Strategic Studies* 7 (June 1984): 135. Probably the first author to postulate that the KH-9/Big Bird was begun as a back-up to the MOL was Curtis Peebles, "The Guardians," *Spaceflight* 20 (November 1978): 381.

²⁴ Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 106.

²⁵ William Burrows, "A Study of Space Reconnaissance: Methodology for Researching a Classified System," in Martin J. Collins and Sylvia D. Fries, editors, *A Spacefaring Nation: Perspectives on American Space History* (Washington, DC: Smithsonian Institution Press, 1991), 227.

²⁶ J.S. Butz, Jr., "Under the Spaceborne Eye: No Place to Hide," *Air Force and Space Digest* (May 1967): 93. Emphasis in original.

data on the Soviet Union" since its creation in 1961. The NRO's satellite systems "established, with considerable accuracy, the actual military capability and preparedness of the Soviet Union. Cost was rarely a question asked. The NRO mission held the highest priority. . . . There is little doubt that the NRO played a major role in the U.S. 'victory' in the Cold War."²⁷

The Concept of MOL

MOL as a Reconnaissance Platform

The Douglas Aircraft Corporation's final MOL configuration was a cylinder 42 feet long and 10 feet wide, weighing 30,000 pounds. The Gemini capsule sitting atop the MOL cylinder would add another 13 feet.²⁸ A mission module added to the payload meant the entire stack on top of the Titan IIIM would be 72 feet high.²⁹ The pressurized portion of the cylinder in which the two officers would live would reportedly be fourteen feet long; the rest of the laboratory would have been unpressurized.³⁰ The volume of the pressurized portion was to have been approximately 1,300 cubic feet; the MOL would maintain an orbit between 125 and 250 nautical miles above the earth's surface.³¹ One historian concluded the MOL's camera would have a lens six feet wide that offered six to nine inch resolution.³² Another said the lens on MOL's telescopic camera was ninety inches wide.³³ A third said MOL's massive

²⁷ Gerald Haines, "The National Reconnaissance Office (NRO): Its Origins, Creation, and Early Years," in the forthcoming *Eye in the Sky* (Washington, DC: Smithsonian Institution Press), 30-31 in manuscript copy.

²⁸ Donald Pealer, "Manned Orbiting Laboratory, Part II," *Quest: The History of Spaceflight Magazine* 4 (Winter 1995): 28. See also "MOL Cancelled," *Space Daily* (June 11, 1969): 179.

²⁹ Donald Pealer, "Manned Orbiting Laboratory, Part III," *Quest: The History of Spaceflight Magazine* 5 (Summer 1996): 16.

³⁰ Seth Payne, "After Apollo Blasts Off, What Next in Space?" *Product Engineering* (October 7, 1968): 11.

³¹ DoD, Space Program Data Sheet on Manned Orbiting Laboratory, July 23, 1964, IRIS 1002993, AFHSO, 1.

³² David Spires, manuscript copy of chapter 3, "The Air Force in the Era of Apollo: A Dream Unfulfilled," from the forthcoming book on the Air Force in space, 1945-1990, to be published by the Office of Air Force History, 1997, manuscript copy p. 46.

³³ Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-1984* (Ithaca, NY: Cornell University Press, 1985), 98.

camera would "provide near real-time reconnaissance of the earth [with] ground resolution of four inches."³⁴ If these conjectures are even marginally accurate, such a capability would be very expensive: initial MOL cost estimates were around \$900 million³⁵ but quickly jumped to \$1.5 billion³⁶ and continued to climb.

It is important to understand that the MOL was conceived of, designed, and evaluated as a reconnaissance-gathering system. The difficulty with this concept is that it was not publicly discussed as such. In open testimony and in the unclassified documents of the time it was consistently described as a system that "... will be able to test and evaluate experimental equipment and determine man's ability to use the equipment in the discrimination, evaluation, filtering, and disposal of data."³⁷ Observers knowledgeable of space affairs could extrapolate that what such generic descriptions were referring to was Sino-Soviet bloc reconnaissance, but the DoD did not publicly acknowledge this and so it was not entirely clear that the MOL was in a sort of dual competition: one to justify its publicly-declared functions as an experimental test bed when compared to NASA's Apollo earth orbital capabilities; and another more clandestine competition against the NRO's robotic reconnaissance satellites. Therefore, the true nature of MOL's planned mission bears some description.

The gathering of intelligence information from space is usually considered to include both the creation of photographic images as well as the collection of the electronic emanations from ground-based

³⁴ Dwayne A. Day, "Invitation to Struggle: The History of Civilian-Military Relations in Space," in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 262. William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Berkley Books, 1986), 228 also stated that a six foot wide lens would make possible four inch resolution.

³⁵ John J. Anderson, Colonel, AFRMO, USAF, Memorandum for Record, Trip Report to General Electric, Simulation Tests, August 20, 1964, IRIS 1002994, AFHSO, 1.

³⁶ Howard S. Davis, Lieutenant Colonel, AFRMO, USAF, Memorandum for Record, MOL Presentation to Dr. Hall, DDR&E, October 8, 1964, IRIS 1002995, AFHSO, 1.

³⁷ Schriever's description of MOL in an address to the National Space Club, May 20, 1964, cited in Lillian Levy, *Space: Its Impact on Man and Society* (New York: W.W. Norton & Company, 1965), 197.

military systems such as radars and communications devices. The MOL was apparently designed to amass both types of information, optical and signals. For instance, AFSC by May 1964 petitioned Headquarters USAF for, and received approval of, a Manned Electromagnetic Signal Detection Experiment aboard MOL for the “. . . detection of electromagnetic signal radiation, with its included elements of reception, demodulation, processing, display, measurement, and recording.”³⁸ This type of intelligence-gathering is generally referred to as SIGINT or signals intelligence (or occasionally as ELINT or electronics intelligence), to distinguish it from the gathering of photographic images of the earth's surface.

In internal documents, the DoD could be slightly more forthright concerning what it envisioned MOL doing. In July 1964 it stated MOL's basic purpose was to investigate and assess the utility of humans for military missions in space: “The tasks will be derived primarily the reconnaissance, surveillance, inspection, detection, and tracking mission areas.”³⁹ Internally, the Air Force was even clearer when it described what the MOL astronauts would do: “. . . the 2-man crew will discriminate, detect, point, track, evaluate, reprogram and command as appropriate in missions of reconnaissance, fly-by inspection, co-orbital inspection . . . and perform support tasks such as navigation, re-entry, etc. The reconnaissance mission tasks seem to be well conceived. . . . They [the crew] examine the area photographs and look for targets and then program themselves on a suitable orbit to take high resolution photographs of targets of interest. High resolution photos are then taken of these targets.”⁴⁰

Also in August 1964 Flax described to NASA Associate Administrator for Manned Space Flight George Mueller the primary military objectives of MOL. One of the most important was “Acquisition and Tracking of Ground Targets,” to evaluate human performance in acquiring ground targets and tracking them “to an accuracy of better than 0.2%.” This task would involve direct viewing of the targets through a pointing and tracking scope controlled by a computer and connected to a camera. Desired targets were

³⁸ USAF, AFSC, Memorandum to Headquarters, USAF, Manned Electromagnetic Signal Detection Experiment for MOL, May 28, 1964, with attached Memorandum from the Vice CSAF approving the experiment, IRIS 1002993, AFHSO, 1.

³⁹ DoD, Space Program Data Sheet on Manned Orbiting Laboratory, July 23, 1964, *supra*, 1.

⁴⁰ John J. Anderson, Colonel, AFRMO, USAF, Memorandum for Record, Trip Report to General Electric, Simulation Tests, August 20, 1964, *supra*, 1-2.

military airfields, operational missile sites, ships, submarines, and "various targets of opportunity." A second MOL objective was "Multi-Band Spectral Observation," the purpose of which was to evaluate man's ability to operate specialized radiometric equipment for the "acquisition and tracking of orbiting objects and/or ballistic missiles during their boost, midcourse and re-entry phases." The third intelligence-related objective of MOL was "Electromagnetic Signal Detection," to evaluate man's ability "... for making semi-analytical decisions and control adjustments to optimize the orbital collection of intercept data from advanced electromagnetic emitters." Finally, the Air Force did hope MOL could also be active in other areas such as: Acquisition and Tracking of Space Targets; Autonomous Navigation; and Geodetic Survey.⁴¹ The Air Force considered these descriptions of MOL's true reconnaissance-related purpose to be highly sensitive. In the fall of 1964 the Air Force did not concur in a proposal to brief the British on MOL because, "The discussion of surveillance and reconnaissance experiments is most inappropriate for a foreign audience and, for that matter, for any audience which does not have a very real need to know."⁴² Throughout the MOL's life, the Air Force restricted information concerning the actual reconnaissance missions of the MOL almost as zealously as the NRO protected its unmanned satellites.

The above explanation of the MOL as a reconnaissance platform has deliberately been confined to the first year after McNamara sanctioned official study of the MOL concept in December 1963. The reason is that on December 1964, McNamara "reoriented and expanded the MOL program, essentially changing it from a research to a developmental and operational program." The MOL's budget increased from \$10 million in FY64 to \$38 million in FY65 and a projected \$150 million for FY66. After McNamara's reorientation, the NASC said MOL's primary objectives were: "a. Development of technology to improve capabilities for manned and unmanned operations of military significance, e.g. reconnaissance, surveillance, inspection. This includes the necessary steps toward operational systems. b. Devel-

⁴¹ Alexander H. Flax, Letter to George Mueller, August 28, 1964, IRIS 1002994, AFHSO, 1-3. Geodesy involves the precise measurement and survey of the surface of the earth and the earth's magnetic fields from space. Among its uses, geodetic information is absolutely vital to the accurate targeting of ballistic missiles.

⁴² Kenneth W. Schultz, Colonel, USAF, Assistant for the Manned Orbiting Laboratory, Deputy Chief of Staff for R&D, Letter of Nonconcurrency, September 29, 1964, IRIS 1002994, AFHSO, 1.

opment and demonstration of unmanned extravehicular assembly and service of large structures in orbit with potential military applications, e.g., large antennas."⁴³ Large antennae are one of the requirements for collecting the electromagnetic emanations necessary for signals intelligence. A contemporary BoB document confirms that a group consisting of the BoB, McNamara, Webb, and Donald Hornig as Presidential Science Adviser in December 1964 did expressly state that the MOL's two primary purposes were: "a. Development of technology contributing to improved military observational capability for manned or unmanned operation. This may include intermediate steps toward operational systems. Examples are side-looking radars, optical cameras of high resolution and large size, etc. b. Development and demonstration of manned assembly and service of large structures in orbit with potential military applications such as a telescope or radio antenna. This will interact strongly with a."⁴⁴ From January 1965 until its cancellation in June 1969, therefore, MOL was even more directly engineered to be reconnaissance and intelligence gathering platform. One consequence of this was that less and less information about its progress was released.

The most valuable piece of evidence that does highlight the centrality of MOL's reconnaissance missions is a recently declassified, detailed, 428-page description of 12 of MOL's 14 primary experiments as of March 1965. A quick synopsis of this document described MOL's experiments as:⁴⁵

- P-1: Acquisition and Tracking of Ground Targets: "Measures man's ability to acquire and track pre-assigned ground targets under varying conditions."
- P-2: Acquisition and Tracking of Space Targets: "Measures man's ability to acquire and track satellite targets under varying conditions."
- P-3: Direct Viewing for Ground Targets: "Measures man's ability to detect surface targets of

⁴³ Eugene B. Konecci, NASC staffer, Memorandum to NASC Executive Secretary Edward Welsh, June 17, 1965, folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

⁴⁴ Kermit Gordon, BoB Director, Memorandum for the Record, Manned Orbiting Laboratory, December 10, 1964, SPI unnumbered document, 1. NASA and the DoD confirmed this decision in a generically-worded press release of January 25, 1965. See NASA News Release, January 25, 1965, Decisions on Manned Orbiting Laboratory and Related Matters, folder: USAF Manned Orbiting Laboratory, DoD subseries, Federal Agencies series, NHDRC, 1-3.

⁴⁵ USAF, AFSC, Space Systems Division, Headquarters. *Primary Experiments Data for the Manned Orbiting Laboratory System (MOL) Program*, March 1965, SSMM-67, SPI unnumbered document, v-vi. P-9 was listed as "Deleted." The MOL program also had an extensive list of secondary or S-series experiments built into the program.

opportunity and to make cursory intelligence assessments.”

- P-4: Electromagnetic Signal Detection: “Measures man’s ability to make semi-analytical decisions and adjustments based on information from electromagnetic emitters.”

- P-5: In-Space Maintenance: “Measures the crew member’s ability to perform in-space maintenance as applied to present and future manned space missions.”

- P-6: Extravehicular Activity: “Determines what functions man can perform outside the spacecraft and what tools he will require for these functions.”

- P-7: Remote Maneuvering Unit: “Measures crew member’s ability to control a maneuvering unit by remote control.”

- P-8: Autonomous Navigation and Geodesy: “Measures man’s ability to navigate in space and to perform geodetic survey of uncooperative targets.”

- P-10: Multiband Spectral Observations: “Determines the crew member’s ability to operate radiometric and related equipment in the completion of military and scientific activities.”

- P-11: General Human Performance in Space: “Measures the day-to-day general performance capabilities of the crew members.”

- P-12: Biomedical and Physiological Evaluation: “Measures the physiological and biomedical factors of the crew members under conditions of long-term orbit and weightlessness.”

- P-13: Ocean Surveillance: “Evaluates the capability of man to control, coordinate, and use a system consisting of various sensors and subsystems to detect, track, classify, and catalogue sea targets.”

This document then described each experiment in intricate detail. For instance P-1 “will require the capability to obtain very high resolution photographs for technical intelligence. The high resolution photographs can be obtained if a sufficiently large optical system is provided and if precise image motion compensation can be accomplished.”⁴⁶ The Air Force was clearly planning to experiment with cutting-edge reconnaissance techniques. For instance, under P-10, it proposed a low light level television which could provide “a capability for viewing targets in the visual spectrum at illumination levels ranging from dusk to quarter moonlight conditions.”⁴⁷ Unfortunately, perhaps the two most important primary MOL experiments were so highly classified that they could not even be originally included in this internal classified Air Force document. P-14 and P-15 were only briefly alluded to in this March 1965 document.

⁴⁶ Ibid., 21.

⁴⁷ Ibid., 307.

A footnote on page 164 said P-14 was an "Antenna Experiment" and that one would have to "See Experiment P-14 Data Book" for more information. Similarly, a footnote on page 165 referred to an "Optics Experiment" and stated "See Experiment P-15 Data Book." One MOL analyst stated, "In order to bolster its case for a separate MOL program based on Gemini-Titan III hardware, the Air Force proposed two additional primary or P-experiments: P-14, essentially the assembly of large structures (radar antenna), and P-15, a large optical system for military space use." Therefore, MOL's role had "... changed from a test-bed program to an operational manned reconnaissance program, with Air Force officials now seeing an open-ended program that would not be limited by six launches as demonstrators of military missions in orbit."⁴⁸ It does strain credulity to believe that in the fiscally constrained environment of the mid- to late 1960s, with NASA's budget being pared every year, that Johnson and the OSD would approve over a billion dollars for a military test bed in space; the Air Force almost certainly had to sell the MOL as an operational intelligence-gathering system or risk its elimination.

This reorientation resulted in the transfer of planned MOL launches from Florida's ETR to Vandenberg AFB on the California coast north of Santa Barbara. Reconnaissance satellites must be in a polar orbit because orbiting over the North and South poles eventually brings all points on the earth's surface beneath the satellite's orbit. In contrast, an equatorial orbit, or one slightly inclined off the equator (the type usually achieved by a launch from Florida) meant that a significant portion of the northern and southern hemispheres would never pass beneath the satellite. Therefore, such non-polar orbits would be unsuitable for reconnaissance of the Sino-Soviet bloc. Polar orbits need to take place from Vandenberg because the earth's rotation ensures that if the rocket launching the satellite were to fail, the reconnaissance satellite would fall into the ocean and the rocket debris would not impact on populated areas. Neither of these conditions can be guaranteed in a launch from Cape Kennedy. Collectively, these facts meant that MOL, when reoriented from a test bed to an operational system, had to be launched from California, not Florida. The Florida political delegation complained about this transfer and Senator Spes-

⁴⁸ Donald Pealer, "Manned Orbiting Laboratory (MOL), Part I," *Quest: The History of Space-flight Magazine* 4 (Fall 1995): 13.

sard Holland even called hearings. Deputy Secretary of Defense Cyrus Vance had to explain to Johnson in February 1966 that using Vandenberg for MOL's polar launches "... has been firm since the primary intelligence mission for the program was approved last year. Prior to that time, when the MOL was being considered for a variety of other experiments, equatorial launches would have been a possibility."⁴⁹

In the Senate hearings questioning MOL's move from the east coast to the west, the DoD steadfastly refused to explain why a polar orbit was essential to MOL's program requirements. Florida Senator Spessard L. Holland pressed DDR&E John Foster on the point but Foster simply repeated again and again, "I am sorry, I can only say that it [a polar orbit] is a requirement of the program. . . . To fulfill the purpose of the program, these inclinations [90° relative to the equator] are required." Holland became angry: "I have asked what I think is an answerable question, and an intelligent question, and you haven't answered yet." Howard W. Cannon of Nevada tried to defuse the situation by asking Foster, "Can the same areas be overflowed with an equatorial flight that can be overflowed with a polar flight." Foster replied, "No, of course not." Cannon: "Does the objective of this flight require that areas be overflowed in a polar orbit that cannot be overflowed in an equatorial orbit?" Foster: "That is correct," because the polar orbit is the only one that "goes over all regions of the Northern Hemisphere or the Southern Hemisphere."⁵⁰ In another hearing, NASA's Seamans explained that the MOL's polar orbit was "... a requirement inasmuch as they [DoD] want to have world coverage and they only get world coverage by going to a polar orbit and it is very difficult to go in a polar orbit from Cape Kennedy because of the overflight problems that ensure."⁵¹ MOL's FY67 budget jumped to \$228.4 million, from FY66's \$150 million.⁵² Projections for FY68 were \$430 million, even though the Air Force said \$510 million was required

⁴⁹ Cyrus R. Vance, Deputy Secretary of Defense, Memorandum for the President, February 12, 1966, NSA MUS document 454, p. 1.

⁵⁰ Congress, Senate, Committee on Aeronautical and Space Sciences, *Manned Orbiting Laboratory*, Hearings, 89th Congress, 2nd Session, February 24, 1966, pp. 35-36.

⁵¹ House, Committee on Appropriations, Subcommittee on Independent Offices, *Independent Offices Appropriations for 1967*, Hearings, part 2, 89th Congress, 2nd Session, 1966, 1266.

⁵² Pealer, "MOL, Part II," *supra*, 34.

to keep the program on track.⁵³ Overall estimated program costs for MOL continued to rise from \$1.5 billion near the end of 1964, to \$2.2 billion by the spring of 1967 to \$3 billion by 1969. The Titan IIIM necessary to launch was expected to cost another \$2 billion to develop.⁵⁴

As seen above, the OSD deemed protecting the reconnaissance-related nature of the MOL's true mission as worth the risk of angering certain members of the Senate space committee. For public consumption, the party line on MOL as an experimental, not an operational system, remained the same: DDR&E Foster told the Senate space committee in March 1968, "MOL's objectives remain unchanged. The system is designed to: develop technology and equipment for the advancement of manned and unmanned space flights; perform meaningful military experiments; and, improve our knowledge of man's capability in space to support defense objectives."⁵⁵ The reality, according to some analysts of the United States reconnaissance satellite effort, was that "MOL was now part of the KEYHOLE program. Its camera was given the designation KH-10 and the program to use MOL for reconnaissance was codenamed DORIAN."⁵⁶ Logic would seem to dictate that since MOL was regarded as an operational, reconnaissance gathering system after late 1964, it would have had to be analyzed, justified, and funded in the context of the NRO's unmanned satellites designed to do the same job.

MOL's Progress through August 1965

December 1963 through August 1965 was a period during which the Air Force struggled to justify MOL's construction to McNamara and the rest of the OSD. The USAF finally achieved success in the summer of 1965 when Johnson approved MOL fabrication, but only after the MOL was reoriented from an experimental test bed to an operational reconnaissance-gathering platform. The official term for this almost two-year period during which the Air Force attempted to find a suitable justification for MOL was

⁵³ Pealer, "MOL, Part III, *supra*, 20.

⁵⁴ John Prados, *The Soviet Estimate: U.S. Intelligence Analysis & Russian Military Strength* (New York: The Dial Press, 1982), 174.

⁵⁵ John Foster, DDRE, Statement to the Senate Committee on Aeronautical and Space Sciences, March 26, 1968, John Foster file, Biographical Series, NHDRC, I-6.

⁵⁶ Jeffrey Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper Collins, 1990), 85.

the Pre-Program Definition Phase. One Air Force office described this as a study and analysis period "oriented to the definition of the optimum concept for accomplishing the development criteria and requirement." This would, in theory, be followed by Phase I, Project Definition phase, and Phase II, Systems Acquisition Phase.⁵⁷ One analyst quipped that the reality of the Pre-Program Definition Phase from 1963 to 1965 was "spending a year or so to decide whether you want to do something after you've announced you're going to do it."⁵⁸ Dr. Albert G. Hall was Deputy DDR&E for Space and in a February 1964 speech he explained, "At this point in time what we are calling MOL is a concept rather than a specific piece of hardware." Therefore, the immediate task was "to detail, by thorough study, what is to go into the program and what we expect to get out of it."⁵⁹ As described above, the eventual conclusion was that MOL had to serve as an operational reconnaissance system.

By 1964 the Air Force had had several years experience with McNamara's PPBS and systems analysis procedures and knew that generalized statements about MOL's purported value and acceptance would not be adequate to ensure its approval. Hard data and quantifiable facts were required. As Undersecretary of the Air Force Brockway McMillan wrote to the USAF Headquarters office responsible for MOL, "... orbital tests will be conducted only when it is determined, from all necessary studies and test short of orbital, that it is both desirable and necessary to perform tests in space." It was assumed that if the Air Force recommended such orbital tests with humans, then "... the determination must be supported by results of a substantive comparison of man's capabilities helped by automatic equipment against purely automatic equipment" because that was the exact comparison the Secretary of Defense would make. Therefore, "It is implicit that a clear analysis and summary of 'man's contribution' must be defined, taking into account the relative performance of man versus unmanned systems, the worth of 'man's contribution,' relative costs, confidence of success, comparative risks, and the probability that most of the pen-

⁵⁷ AFSC, Memorandum to Headquarters, USAF, Manned Electromagnetic Signal Detection Experiment for MOL, May 28, 1964, *supra*, attachment 2, p. 1.

⁵⁸ Adam Gruen, *The Port Unknown* (Ph.D. dissertation, Duke University, 1989), 269.

⁵⁹ Albert G. Hall, Deputy DDR&E for Space, Speech on The Objectives of the Military Space Program, February 5, 1964, Albert G. Hall file, Biographical series, NHDRC, 7.

alties of the life support system are borne by other experiments.”⁶⁰ The relatively low MOL budgets for FY64 of \$10 million and FY65 of \$38 million are thus explained by the fact that little was going on besides studies and analyses. These inquiries did enable, however, the Air Force by March 1965 to publish a 400 page document outlining the primary experiments for MOL.

The USAF’s conclusion, as expressed in September 1964 by Lieutenant General James Ferguson, Deputy Chief of Staff for R&D, was that “We have studied these testing requirements, and we have concluded that a manned military test station in space provides the only reasonable solution to the problems of testing equipment designed for use in space.”⁶¹ McNamara was equally clear in December:

My principle is a very simple one. I believe we are a military organization, we are not interested in space except insofar as it bears directly on our military mission. If there is anything that NASA can do, that we can in effect hire them to do as our agent, I am 100% in favor of doing so. . . . I want to be sure that the MOL program, the details of it are fully analyzed by NASA and fully taken into account when NASA establishes any portion of its Apollo program not directly related to the lunar program. . . . I want to be certain that the Air Force, when it establishes the MOL, takes account of what NASA is required to do as part of the Apollo program that in turn is directly related to the lunar program. And, in turn, I want to be certain that NASA, to the extent that it expands Apollo beyond the limits required for the lunar program, takes into account whatever we must do in the MOL to meet bona fide and military objectives.⁶²

The principle that caused the Dynasoar difficulties in justifying its existence in the context of the capabilities offered by NASA’s Gemini was going to play itself out again as the MOL faced the fact that NASA was also planning an extensive follow-on program to the Apollo lunar landing called Apollo Applications Program (AAP⁶³) that had within it a component calling for continued exploration of earth orbital applications. Therefore, there was little that the USAF could do besides emphasizing the reconnais-

⁶⁰ Brockway McMillan, Undersecretary of the Air Force, Memorandum for Colonel Schultz, Assistant for Manned Orbiting Laboratory, AFRMO, Subject: MOL Experiments on Electromagnetic Signal Detection, July 2, 1964, IRIS 1002993, AFHSO, 1, 3.

⁶¹ Cited in Colonel Kenneth W. Schultz, Assistant for Manned Orbiting Laboratory, Deputy Chief of Staff for R&D, Congressional Preparation Instruction Letter # 1, Chief of Staff Policy Book - 1965, September 1964, IRIS 1002994, AFHSO, 2.

⁶² Cited in “Secretary McNamara Seeks NASA-AF Cooperation on Manned Orbiting Laboratory,” *Journal of the Armed Forces*, (December 26, 1964): 21.

⁶³ Before the term Apollo Applications Program (AAP) began to be universally employed, one could see the general concept of continuing to use Apollo-Saturn hardware for purposes of earth orbital R&D referred to as Apollo X, as Apollo Extended System (AES) and as Extended Apollo System (EAS). For purposes of clarity, this dissertation will employ AAP consistently.

sance capabilities of the MOL because this would clearly not compete with NASA's mission (although it would throw the MOL into competition with the NRO's systems). Refashioning the MOL as an operational reconnaissance vehicle did enable the Air Force to fulfill OSD's stringent criteria for justifying a space project. It also meant that in the long term the MOL had to be justified when compared to the KH-series of NRO reconnaissance satellites. As Johnson's science adviser Donald Hornig declared, "One shouldn't risk the life of man on things you can do with instrumented things."⁶⁴

The preceding section on MOL as a reconnaissance platform described the late 1964/early 1965 process in which the MOL was reoriented into an operational reconnaissance system. This proved to be the necessary step required to gain McNamara's and eventual presidential approval to begin building MOL. The final sprint toward presidential approval began with an NASC meeting on July 9, 1965. McNamara simply stated that concerning the question of unmanned versus manned systems for intelligence gathering, "He had concluded that you could get a better result using a manned system. However, they also had worked out the cost effectiveness and even though the manned program development costs would be two-to-one compared to the unmanned" the manned would turn out to be cheaper "for the same or better information, since fewer launches would be made. This, then, would offset the larger initial cost of manned launches versus unmanned launches." McNamara added "... that NASA can't perform the reconnaissance mission and that the details of such a mission could not be discussed publicly." He stated in closing that the main reason to proceed with MOL "... was to obtain information quickly and on a selective basis ... this would require the manned system. ... Secretary McNamara indicated that the DOD was prepared at a later date in the program to go either way, manned or unmanned; and in fact they were recommending to go both ways initially."⁶⁵ Therefore, even on the brink of approving MOL construction, McNamara did not seem overly enthusiastic about the system and clearly was preserving the option of continuing with an entirely unmanned family of reconnaissance satellites. Some within Con-

⁶⁴ Cited in George C. Wilson, "President Will Outline U.S. Space Goals," *Aviation Week and Space Technology* (January 11, 1965): 12.

⁶⁵ NASC, Summary Minutes, NASC Meeting, July 9, 1965, folder: Official Record Copy, NASC Meeting, July 9, 1965, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA, 2-4. Declassified at author's request.

gress were clearly eager for the OSD to finally make a decision on the MOL. Said one report, the "Air Force should be commissioned, without further delay, to execute a full-scale MOL project." This would of course be done "without prejudice to NASA's future requirements for manned space stations."⁶⁶

On August 25, 1965 the White House released a statement from Johnson: "I am today instructing the Department of Defense to proceed with the development of a Manned Orbiting Laboratory." He estimated costs at \$1.5 billion and the first manned flights in late 1968.⁶⁷ At a press conference that same day Johnson said, "This program will bring us new knowledge about what man is able to do in space." There was no direct discussion of exactly what MOL would do, much less its central reconnaissance mission.⁶⁸ A briefing by an individual the press was instructed to refer to only as a "Defense Official" included the following exchange: "Question: What's the purpose of a polar orbit that you plan. (Laughter) Defense Official: I didn't say we were planning polar orbits."⁶⁹ Again, fade to black.

Nevertheless, speculation concerning the MOL's purpose was rampant in the press. *Aviation Week and Space Technology* concluded the MOL "is now conceived primarily as a reconnaissance/surveillance payload." It would use both electronic and photographic sensors to relay data to ground stations by digital data transmission. The pictures would be of adequate resolution so that ejection of photographic capsules was not necessary. Other sensors such as low-light level television, zoom lenses, high resolution radar, and a variety of electronic ferret devices would also be available.⁷⁰ The *Washington Post* speculated, "Large and powerful segments of the Johnson administration were sold on the Air

⁶⁶ Congress, House, Committee on Government Operations, *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*, Thirteenth Report, Report No. 445, 89th Cong, 1st Session, June 4, 1965, pp. 11, 17.

⁶⁷ White House, Office of the Press Secretary, Statement of the President, August 25, 1965, NSA MUS document 453, p. 1.

⁶⁸ Johnson, News Conference, August 25, 1965, *Public Papers of the President, 1965* (Washington, DC: USGPO, 1966), 917.

⁶⁹ DoD, Background Briefing on the Manned Orbiting Laboratory, August 25, 1965, NSA MUS document 452, p. 11.

⁷⁰ Donald Fink, "CIA Control Bid Slowed Decision on MOL," *Aviation Week and Space Technology* (September 25, 1961): 21.

Force's Manned Orbiting Laboratory simply as an intelligence tool. But it was the added possibility in the arms control field that brought unanimity. As one key official put it: 'If this does what we think it will do, MOL will be the greatest boon to arms control yet.' . . . The primary mission of MOL . . . is without doubt to have men supplement the machine as a shutterbug spy in the sky."⁷¹ If nothing else, "The President's agreement to proceed with MOL meant the end of a ten-year struggle by the Air Force to gain a role in manned space flight."⁷² The open question was whether or not MOL would ever get off the ground.

NASA and MOL

NASA leaders never publicly questioned the need for MOL nor did they agree with assessments that it duplicated NASA's general R&D program or the AAP specifically. However, outside commentators did not hesitate to write, "By the time MOL is placed in orbit, NASA's capabilities will exceed those envisaged for MOL. . . . when one examines the 'complex tasks' envisaged for military astronauts, one finds it difficult to locate a single function that NASA has not already performed or is planning to perform, or is capable of doing."⁷³ This illustrates the price the Air Force and DoD paid for maintaining strict secrecy concerning the MOL. Since many analysts, and probably congressmen, had no official knowledge or confirmation that the crucial justification for MOL's existence was to collect intelligence, the MOL could be compared to NASA's AAP and declared redundant. In fact, its distinguishing characteristic of reconnaissance made it radically different from AAP's R&D activities in low earth orbit but defense officials would not or could not point this out due to security restrictions.

NASA's public declarations continued to support the MOL in accordance with the position paper drafted internally by Seamans in late 1963/early 1964 and discussed in chapter 8. For instance, shortly after the December 1963 preliminary MOL approval, Seamans wrote DDR&E Brown, "Since it is evident

⁷¹ Howard Simons and Chalmers Roberts, "Role in Arms Control Clinched MOL Victory," *Washington Post*, September 5, 1965, 1.

⁷² Erlend A. Kennan and Edmund H. Harvey, *Mission to the Moon: A Critical Examination of NASA and the Space Program* (New York: William Morrow & Company, 1969), 200.

⁷³ Leonard Schwartz, "Manned Orbiting Laboratory - For War or Peace?" *International Affairs* 43 (January 1967): 56.

that NASA can support the MOL project in several ways, we are planning on providing such support in a manner that will give the greatest assurance of MOL success and at the same time maintain the momentum of the current NASA space program."⁷⁴ Throughout MOL's history, NASA regularly expressed its willingness to support MOL with its Gemini hardware and facilities as much as possible. In addition, it continued to maintain that MOL and AAP were closely coordinated and not duplicative. Finally, NASA said it would be happy to take advantage of MOL's experimental capabilities: Associate Administrator for Manned Space Flight George Mueller declared, also in January 1964, "NASA will have a requirement for experiments which can be accomplished by the MOL system."⁷⁵

Webb regularly testified to Congress that, "The Gemini-B/MOL program was needed by the DOD to make an early determination of the utility of a man in space. The DOD will be able to move ahead rapidly with plans to make this determination within the desired time frame by virtue of the fact that the necessary technology and capacity to provide the hardware and to conduct such an operation have been developed by NASA and are available." More specifically, Webb stated, "The DOD MOL program will be accomplished using many component systems and operational techniques which have been developed and proven by NASA. Necessary supporting facilities established by NASA will be made available and fully utilized. . . . At the same time, NASA will take full advantage of the opportunities presented by the MOL to further its research and development effort."⁷⁶ This is representative of NASA public statements concerning its use of MOL for experiments and the DoD's use of NASA resources (Gemini capsules, tracking and data acquisition facilities, communications, command and control equipment, etc.) for MOL during MOL's 1963-69 existence. The MOL would, in fact, incorporate numerous components

⁷⁴ Seamans, Letter to Harold Brown, January 6, 1964, folder: Defense 1964-1965, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

⁷⁵ George Mueller, Memorandum to the NASA Associate Administrator, January 15, 1964, folder: NASA-DOD, box: Arnold S. Levine, Selected Sources from the author, NHDRC 1.

⁷⁶ Webb, Statement before the Senate Committee on Aeronautical and Space Sciences, March 4, 1964, folder: Senate Committee on Aeronautical and Space Sciences, box 153, James Webb papers, HSTL, 34-35.

from the Gemini and Apollo systems such as power supplies, environmental control systems, guidance and navigation equipment, and reaction control systems.

As the minutes of a NASA meeting from July 1965 plainly stated, "We were in agreement that NASA cannot oppose a manned laboratory when the DOD puts it in the terms of a national security requirement. There is the implied priority of any program which is related to national defense." NASA was, however, honest with itself: "If one excludes the highly classified military mission, there is a high degree of commonality in the experiments which NASA and DOD need or would like to perform in space."⁷⁷ In the NASC meeting of July 1965, "Administrator Webb indicated that he also supported the MOL program. He asserted that it was no different than many others where originally DOD's missiles were used as building blocks by NASA. Now the Department of Defense can use NASA's manned space flight experience for its purposes."⁷⁸

NASA and the DoD coordinating the initial stages of the MOL through the regular AACB channel of the Manned Space Flight Panel. For instance, they signed an agreement in January 1965 concerning DoD use of NASA control centers and tracking network stations that stated, "In general, NASA facilities will be made available to support the Air Force GEMINI B/MOL program, having due regard for national priorities and to the extent that such use is compatible with international agreements covering tracking stations on foreign territory."⁷⁹ Concerning the use of the MOL for NASA scientific experiments, however, NASA did not sound very optimistic. In answer to a vice presidential question, NASA said, "It should be recognized that the security requirements of the DOD MOL program will impose limitations on such participation." In addition, since military objectives would have first priority for MOL launches, "NASA would have difficulty in maintaining a high level of interest among the scientific community in experimental efforts which, although meaningful, could only be flown on a space available ba-

⁷⁷ Earl Hilburn, NASA Deputy Associate Administrator for Industry Affairs, Memorandum to the Associate Administrator, NASA Position with Respect to Proposed DOD/MOL Program, July 1, 1965, folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC, 1.

⁷⁸ Summary Minutes, NASC Meeting, July 9, 1965, *supra*, 4.

⁷⁹ NASA-AF Agreement, GEMINI B/MOL Control Center and Network Support Procedures, January 28, 1965, folder: MOL 1965-67, DoD subseries, Federal Agencies series, NHDRC, 1.

sis.”⁸⁰ NASA still maintained, however, after MOL received final approval in August 1965 that the system could use NASA facilities: “We stand ready to plan with you for the maximum practicable utilization by the DOD of the NASA developed hardware and technology, our production, testing, checkout, simulation, training, mission control, and data acquisition and processing facilities, and our management and operational experience.”⁸¹

Evidently the two organizations foresaw enough systemic interaction to merit creation of a separate committee outside the AACB parameters to concern itself with NASA-DoD human spaceflight issues. In January 1966 they created the Manned Space Flight Policy Committee (MSFPC) as a “means of expediting coordination at a policy level the manned space flight programs of the two agencies.”⁸² Chaired by the DDR&E and NASA’s Deputy Administrator, the MSFPC took the place of the old GPPB, which was then disbanded.⁸³ In March 1966 NASA and the DoD created yet another body, the Manned Space Flight Experiments Board (MSFEB) to: recommend approval or disapproval of experiments to be conducted under NASA and DoD manned space flight programs, i.e., MOL and Apollo; recommend assignment of experiments to specific flights; and recommend relative priorities of experiments to be implemented and periodically review the numbers of experiments scheduled for specific missions.⁸⁴ The importance of bodies such as the MSFPC and MSFEB was not so much found in any specific decisions they may have made but rather that they indicated the continued good-faith attempt by the NASA and DoD to coordinate their human spaceflight programs as closely as possible so as to avoid duplication and waste. However, by

⁸⁰ NASA, Answers to Vice President Hubert Humprey’s 21 Questions on MOL, July 29, 1965, safe # 1, drawer 2, folder: MOL/AES, NHDRC, 28-29. Declassified at author’s request.

⁸¹ Seamans, Letter to Brown, September 27, 1965, folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC, 1.

⁸² Executive Office of the President, *US Aeronautics and Space Activities, 1966*, Report to the Congress from the President, January 1, 1967, NSA MUS document 333, p. 71.

⁸³ For full details see Webb and McNamara, Memorandum of Understanding, Manned Space Flight Programs of the Two Agencies, January 14, 1966, IRIS 1003002, AFHSO.

⁸⁴ Seamans and Foster, Memorandum of Agreement, Establishment of a Manned Space Flight Experiments Board, March 21, 1966, folder: MSF Panel AACB, box: Aeronautics and Astronautics Coordinating Board # 2, NHDRC, 1-2.

March 1966. NASA had not yet indicated the desire to conduct any experiment on the MOL.⁸⁵ Seamans told this dissertation's author that he had no recollection of NASA ever designing any experiments to be flown on the MOL.⁸⁶ However, a secondary source suggested that NASA did have an experiment prepared for MOL deployment: a carbon dioxide sensor.⁸⁷

Nevertheless, Mueller reported in that by mid-1966 NASA had transferred to the DoD's Gemini B/MOL effort some \$20-\$25 million dollars worth of equipment, to include two Gemini capsules, an environmental control system, an attitude control system, a communication system, pressure suits, and a fuel cell power supply.⁸⁸ In March 1968, Webb told Congress NASA had turned over more than \$100 million worth of hardware and support equipment to the Air Force for use with MOL.⁸⁹ There are some fleeting indications, however, that not all was completely smooth in the NASA-DoD human spaceflight coordination arena.

Perhaps some tension in the NASA-DoD/AAP-MOL field was inevitable. After all, in the words of one government report, the MOL "ran full tilt into competition with NASA plans for near-earth orbiting laboratories and stations."⁹⁰ Webb's biographer concluded that when the MOL was approved, "NASA was not happy about this. However, there was strong support in Congress for a military manned space program of some sort."⁹¹ In another text Lambright added that when the Air Force was granted the MOL,

⁸⁵ Testimony of Dr. Alexander Flax of the Office of the DDR&E, Congress, House, Committee on Armed Services, *DoD Authorizations for Fiscal Year 1967*, Hearings, 89th Congress, 2nd Session, March 1966, p. 528.

⁸⁶ Oral history interview of Seamans, July 5, 1996, by the author.

⁸⁷ Kennan and Harvey, *Mission to the Moon*, 204.

⁸⁸ George Mueller, Memorandum to Boone, NASA Hardware Support to the MOL Program, May 3, 1966, folder: USAF Manned Orbiting Laboratory, DoD subseries, Federal Agencies series, NHDRC, 1, 4.

⁸⁹ Congress, Senate, Committee on Appropriations, *Independent Offices Appropriations, Fiscal Year 1969*, Hearings, 90th Congress, 2nd Session, March 1968, p. 1091.

⁹⁰ *Government Operations in Space*, 89.

⁹¹ W. Henry Lambright, "James Webb and the Uses of Administrative Power," in Jameson W. Doig and Erwin C. Hargrove, editors, *Leadership and Innovation: A Biographical Perspective on Entrepreneurs in Government* (Baltimore: The Johns Hopkins University Press, 1987), 190.

"NASA was injured by the decision, and its post-Apollo planning with respect to possible laboratories in space was constrained. If it was to include a MOL-type concept in its own plans, it would have to do so in spite of the Air Force program."⁹² Arnold Levine reported his NASA sources concluded that "... considerably less than 1 percent of the data obtained by MOL would be superior to what would be obtainable from available systems. . . . In effect, some NASA technical managers suspected that MOL really did duplicate NASA programs, at a time when influential Congressmen were demanding less duplication and more standardization."⁹³

Some primary source evidence does exist that points to a certain level of negative feeling within NASA toward the MOL. Levine examined tapes of NASA meetings and presented a transcript from one in September 1966 involving NASA center directors and Webb. One director stated, "MOL is a rather poor program at best and they [DoD] have never justified it properly. Now, you [Webb] haven't wanted to attack them . . . because I don't think McNamara is a nice guy to attack, he is rough. Webb: Well, hell, he has attacked MOL worse than I have. Official: Well, my point is that MOL is a very poor program. At one time it would have been a halfway decent program but it is way out of date now. . . . I say it right now that MOL is no good. They are always too late."⁹⁴ One of Webb's personal consultants wrote him through Seamans, "The rub is, however, that a MOL operation such as is now planned by the Air Force would go far beyond what is necessary for direct military purposes - will in fact lead to a second and strictly military national space program. In this lies a serious danger not alone for NASA and its assigned mission, but for the basic philosophy underlying the whole U.S. approach to space exploration and utilization. The Air Force plan calls for a complete space system, one that would parallel NASA practically every step of the way." This consultant said that with a second strictly military space program, "NASA would obviously lose ground and in a variety of ways from the development." He recommended:

⁹² W. Henry Lambright, *Presidential Management of Science and Technology: The Johnson Presidency* (Austin, TX: University of Texas Press, 1985), 68.

⁹³ Arnold S. Levine, *Managing NASA in the Apollo Era*, NASA SP-4102 (Washington, DC: USGPO, 1982), 234.

⁹⁴ Ibid.

"Accelerate AES [AAP] so that it may be operational by roughly 1970 in order that it may obviate any need for an extension of the MOL program beyond its original purposes."⁹⁵

Nicholas Golovin, of LLVPG fame, who had subsequently moved to the Office of Science and Technology, now under Donald Hornig, continued to criticize the space program. He concluded, "If NASA and DOD are left to themselves, they will not internally generate either the necessary will or the administrative means for effective technical coordination in orbital manned space flight. If so, the total national costs for these activities will turn out to be greater than they need be and, more importantly, the rate of progress . . . might turn out to be slower than it otherwise could be."⁹⁶ Despite these disparate grumblings concerning the NASA-DoD human spaceflight interface, the NASA leadership at the Webb-Seamans level remained officially and seemingly actually supportive of MOL. A Seamans letter to Webb perhaps expressed the NASA-MOL situation best:

I feel that concern for peaceful versus military 'image' is often overrated in importance, and that this consideration is not the basic rationale for the Space Act of 1958. I believe the fundamental issue is how best to make effective use of aeronautical and space exploration both nationally and internationally. Certain activities must be kept classified for reasons of national security, and I believe this is generally recognized and accepted internationally. . . . There is no basis for our questioning the primary objectives stated by the DOD for their MOL. These objectives are peculiar to stated military operations at this time. . . . If the Gemini B-MOL-Titan III is implemented, we should consider its use along with Apollo-Saturn to meet national aeronautical and space objectives under NASA control.

Seamans closed by reiterating that if the MOL program was implemented, "NASA should support its development."⁹⁷ For the most part NASA did support MOL as much as possible during the developmental phase and seemed prepared to continue to do so if it ever became operational. On the other hand, there seemed to be little effort on NASA's part to develop scientific experiments for MOL deployment.

⁹⁵ Mose Harvey, Memorandum for Dr. Seamans, The MOL Problem, July 2, 1965, safe # 1, drawer 2, folder: MOL/AES, NHDRC, 1-3. Declassified at author's request.

⁹⁶ Nicholas Golovin, Memorandum for Donald Hornig, Coordination of NASA and USAF Programs in the Technology of Manned Space Flight, July 5, 1967, folder: NASA/OMSF, box 716, RG 359, Records of the Office of Science and Technology, NARA, 3. Declassified at author's request.

⁹⁷ Seamans, Memorandum for Webb, Position of NASA in Regard to a Military MOL Program, July 7, 1965, folder: MOL Correspondence II, DoD subseries, Federal Agencies series, NHDRC, 2-3. Emphasis in original.

The Concept of AAP

There have been a number of allusions to NASA's Apollo Application Program in the last few pages. The discussion now turns to a brief survey of the origins and early evolution of this program. This treatment need not be as comprehensive of the MOL for two reasons. First, AAP's ultimate programmatic execution came in the 1970s, primarily with the three Skylab missions, and its therefore outside the scope of this dissertation. Second, the present author is convinced that the role that perceived duplication with AAP played in MOL's demise was only one of three main factors, along with financial considerations, and perceived duplication with reconnaissance satellites. Therefore, a detailed discussion is not required but a survey is. The first factor in easing into a look at AAP is to examine exactly why Webb was not enthusiastic about mapping out a specific path toward NASA's future, of which AAP was one part.

NASA's Reluctance to Plan for the Future and AAP

On January 30, 1964 Johnson asked Webb to review NASA's future space exploration plans so as to relate hardware and development programs to prospective missions. Webb's preliminary 28-page reply on May 20, 1964 was completely lacking in specifics and was simply a laundry list of NASA's past accomplishments, studies currently being conducted, and the numerous possibilities for the future. On the final page Webb concluded, "An extensive analysis of each mission is being made to determine its requirements in manpower, facilities, and other resources and to balance these against the value of potential returns in the form of new national space capabilities, new knowledge, new civilian and military applications and new industrial capabilities."⁹⁸ NASA's final report in response to Johnson's asking it about the future did not come until January 1965, fully one year after the presidential tasking. NASC staffer Charles Sheldon commented on a draft version of it: "NASA defensively points out all the reasons why no one should rock the boat at this time. I agree they cannot set new goals without the building of a national consensus, but I think we are entitled to more leadership in this regard than has been illustrated." Sheldon characterized the report as "... so safe and so sane that it does not really make anyone feel a new sense of purpose or enthusiasm, or that the country is going to strike out boldly and achieve a true position of lead-

⁹⁸ Webb, Letter to Johnson, May 20, 1964, folder: National Aeronautics and Space Administration, 1964, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA, passim, 28.

ership. There is more a plea that we wait to see what others will do, and then will try hard to match them in some way." He concluded that the "galloping conservatism" of NASA's future planning constituted a "... continual shying away from new missions [which] plays right into the hands of those who would end advanced work on the grounds of lack of requirements."⁹⁹

NASA's final report to Johnson in January 1965 bore out Sheldon's preliminary conclusions. Its 61 pages did not in essence progress beyond the statement, "Unless an urgent National need arises, large new mission commitments can, better than in previous periods, be deferred for further study and analysis based heavily on ongoing advanced technical developments and flight experience." NASA's position was that the main requirement of future programs was simply: "First, apply available resources to every aspect required for success in the ongoing programs, especially the Apollo program, and to bring these to fruition as quickly and efficiently as possible." Second, NASA should define an "intermediate group of missions and work toward them using the capability being created in the on-going programs. . . ." The final step would be to "continue long range planning of missions that might be initiated late in this decade or early in the 1970s." The remainder of the report outlined present capabilities NASA had built up, the types of intermediate and long term capabilities that could be created, the general categories of experiments that NASA might undertake, and the various potential configurations of possible systems such as a large manned orbiting research laboratory, a lunar base, or a manned planetary exploration mission. There was, however, nothing in the way of specific missions or concrete commitments in the report.¹⁰⁰

As NASA Historian Roger Launius has noted, "Webb was quite reluctant to commit NASA to specific goals and priorities in advance of any expression of political support, preferring instead to list a range of possible tasks and to ask top policymakers to choose the options they wished to pursue. This was

⁹⁹ Charles S. Sheldon, NASC, Memorandum to NASC Executive Secretary Edward Welsh, Draft NASA Report to the President, November 24, 1964, tab 2, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA, 1, 3. Declassified at author's request.

¹⁰⁰ NASA, *Summary Report: Future Programs Task Group*, January 1965, folder: National Aeronautics and Space Administration, 1964, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA, 4-6, passim.

the approach taken in this January 1965 report by NASA to President Johnson.”¹⁰¹ In addition, that approach marked NASA planning throughout Webb’s tenure and assured the AAP would not be crafted as a large and ambitious project, nor would it move quickly to fruition along with Project Apollo because Webb wished to avoid any possible internal NASA competition for funds between projects. According to the minutes of an NASC meeting in March 1966, “Mr. Webb doubted the wisdom of setting new goals without some reason to expect Congressional support, and that we should preserve our options. Most definitely we should not tell the public about future plans until the President had made a decision.” When Seamans suggested that there might be Saturn-class vehicles left over after completion of Project Apollo and thus available for something like AAP, Webb interjected, “but they could not be released without the danger of failing to meet the lunar landing commitment.”¹⁰² NASA’s Associate Administrator for Manned Space Flight George Mueller recalled, “It was rather clear that Jim Webb did not want a plan.” When Mueller’s office floated the idea of a Mars expedition in 1966 or 1967, Webb replied, “Absolutely not. We don’t want to have a plan like that. First we’ve got to do the moon before we begin to put into effect a longer-range plan” because for every person that would support it there would be ten to shoot it down. Mueller said Webb was unable to “. . . find any overall national consensus that said we had to have a plan past the moon. . . . after the [January 1967] fire it became even more obvious that we ought to be sticking to our knitting and not producing what he would call grandiose plans for the future.”¹⁰³

In all fairness to Webb’s perspective, he was not alone in his reluctance to embrace any next-generation space goals. A State Department report in October 1966 stated, “From the standpoint of our foreign policy interests, we see no compelling reasons for early, major commitments to such goals, or for pursuing them at the forced pace that has characterized the race to the moon. Moreover, if we can de-emphasize or stretch out additional costly programs aimed at the moon and beyond, resources may to

¹⁰¹ Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 189.

¹⁰² NASC, Summary Minutes, NASC Meeting, June 15, 1966. folder: NASC Meeting June 15, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA. 5.

¹⁰³ Oral history interview of George Mueller, November 8, 1988, NASM, 182-83.

some extent be released for other objectives . . . which might serve more immediate, higher priority U.S. interests.” The State Department’s bottom line was, “Instead of indefinitely extending the space race, it would be preferable to work toward a twofold objective: ‘De-fusing’ the space race between the U.S. and Soviets [and] . . . Bridging the gap between the space powers and others.”¹⁰⁴ There was, therefore, no groundswell of support within the Executive branch to boldly forge new space initiatives. As the State Department speculated, “. . . after the U.S. and Soviets have achieved manner lunar landings, it is likely that international interest in the space race as such will subside. Excitement concerning specific space spectacles may also diminish.”¹⁰⁵ Therefore, the United States should “. . . seek to move away from an extension of the space race and toward more orderly and internationally responsible ways of doing business in space.”¹⁰⁶

Webb’s biographer also tried to put Webb’s refusal to set NASA on a particular course for the future into its proper context. Lambright said Webb was fully aware of four factors that made it impossible to forge a consensus on a future space program and therefore did not push any such effort because to do so only would have created additional political, budgetary, and bureaucratic difficulties for NASA. “First, NASA’s own success made a difference,” in the sense that America by the mid-1960s was doing well in space while the Soviets appeared to be losing momentum. Lambright continued: “Second, the nation and President Johnson were increasingly distracted from space by two other larger efforts: the Great Society and the Vietnam War. Third, at a time when gaining support for post-Apollo was most critical, Apollo was yet to be completed. Fourth, the overall space budget was suffering cutbacks in a period of general financial stringency, and the NASA priority had to be to spend its diminishing resources to maintain Apollo rather than to establish post-Apollo efforts.” Therefore, “It is doubtful that anyone could have sold a post-Apollo program in the environment of the late 1960s.”¹⁰⁷ However, to understand the

¹⁰⁴ State Department, Report, Space Goals after the Lunar Landing, October 1966, SPI document 849, pp. i-ii.

¹⁰⁵ *Ibid.*, 2.

¹⁰⁶ *Ibid.*, 19.

¹⁰⁷ W. Henry Lambright, “James Webb and the Uses of Administrative Power,” *supra*, 194-95, 200.

difficult circumstances with which Webb had to deal in crafting NASA's future is not to deny the ultimate consequences of his failing to do so.

For instance, Lambright fully admits that the cost of Webb's focus on completing the lunar landing mission to the exclusion of future planning "... was retrenchment in the early efforts to launch a post-Apollo program. . . . The decision *not* to sustain the momentum of Apollo through an equally large-scale, follow-on effort had been made incrementally, year by year. . . . The consequence was drift and frustration." The MOL also figured into the equation. Its approval "... showed NASA that it could not take Johnson's support for granted. If NASA did not move quickly enough, the other agencies would."¹⁰⁸ Other scholars take these points even further. Arnold Levine concluded, "One of the major reasons for the decline in the NASA budget was the agency's failure to plan effectively for the long term."¹⁰⁹ Another concurred, "The fact that NASA leaders in the mid-1960s did not propose post-Apollo goals and defend them in the budget process virtually ensured a situation in which there was no clear future for the civilian program."¹¹⁰

AAP's Origins and Early Evolution Through Late 1965

The ambiguity surrounding NASA's future meant that the AAP got off to a rocky start and had significant difficulty being defined. Wrote NASA Associate Administrator for Space Science and Application Homer Newell, "During the muddy period of planning for an Apollo Applications Program that was not going to sell, Webb often stated to his colleagues in NASA that he did not sense on the Hill or in the administration the support that would be needed to undertake another large space project." Newell explained, "Webb preferred to hold back and listen to what the country might want to tell the agency. It was his wish to get a national debate started on what the future of the space program ought to be, with the hope that out of such a debate NASA might derive a new mandate for its future beyond Apollo. But no

¹⁰⁸ W. Henry Lambright, *Presidential Management of Science and Technology: The Johnson Presidency*, supra, 141, 143. Emphasis in original.

¹⁰⁹ Levine, *Managing NASA in the Apollo Era*, 207.

¹¹⁰ Cass Schichtle, *The National Space Program from the Eighties to the Fifties*, National Security Affairs Monograph Series 83-6 (Washington, DC: National Defense University, 1983), 28-29.

such debate ensued. In a country preoccupied with Vietnam and other issues, the space program no longer commanded much attention."¹¹¹ In fact, the primary decision concerning AAP's final primary configuration as a fully equipped space laboratory (later renamed Skylab) launched on a Saturn V was not made until late July 1969 by new NASA Administrator Thomas Paine, after both MOL's cancellation and the accomplishment of the lunar landing and is thus largely outside the scope of this dissertation. Nevertheless, AAP does have an important role in history of space in the 1960s in general and in the MOL's fate in particular.

NASA's planning for large space stations continued after the process described for the Kennedy administration in chapter 8. Edward Z. Gray was the Director of Advanced Studies in NASA's Office of Manned Space Flight. In a January 1964 interview he suggested NASA's space station would be more sophisticated than the MOL. He also described more than a dozen study projects NASA had underway which when completed would allow NASA to appraise its requirements and pursue the best approach to developing a space station.¹¹² Throughout 1964 the AACB's Manned Space Flight Panel's National Space Station Planning Subpanel (NSSPS) met four times to coordinate NASA-DoD space station studies but "then lapsed into inactivity."¹¹³ The simple fact was that once the OSD decided to support MOL it had little desire to consider a larger, more capable, and even more expensive space station (even though MOL was technically not defined as a space station) until MOL's experiments could be conducted and analyzed. For example, in FY64 NASA had at least 11 separate space station studies with a total budget of \$22.1 million examining concepts ranging from a modified Apollo system weighing 15 tons for four to six humans, to a 100 ton giant for 18-24 people. DoD had just one study at \$1 million which was scheduled for termination after FY64 due to MOL approval in December 1963.¹¹⁴

¹¹¹ Homer E. Newell, *Beyond the Atmosphere: Early Years of Space Science*, NASA SP-4211 (Washington, DC: USGPO, 1980), 285.

¹¹² Roland W. Newkirk, Ivan D. Ertel, and Courtney G. Brooks, *Skylab: A Chronology*, NASA SP-4011 (Washington, DC: USGPO, 1977), 29.

¹¹³ W. Fred Boone, *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32 (Washington, DC: USGPO, 1970), 93.

¹¹⁴ Michael Yarymovych, NASA, and Colonel Kenneth W. Schultz, Report to the Manned Space Flight Panel of the AACB on DOD-NASA Advanced Earth Orbital Systems Study Coordination, IRIS

NASA was, in essence, left alone to study possible configurations of and purposes for a large space station. In the words of the Air Force officials assigned to monitor NASA's space station work, "Taken in total, it is evident that the NASA space station study program encompasses the entire spectrum of space station capabilities from the small, with limited capability and orbital lifetime, to the large, with extensive capability and lifetime."¹¹⁵ However, as explained above, Webb was not keen on any future space station effort progressing beyond the study stage. Therefore, if NASA was to have an earth orbital presence outside of that inherent in Project Apollo, it would clearly somehow have to modify the already-available Apollo-Saturn hardware for additional and extended earth orbital experimentation. Thus was born the idea of the Apollo Extended System/Extended Apollo System or Apollo X, more commonly referred to as the Apollo Applications Program or AAP.

One should note at this point that this dissertation's discussion of AAP will focus on one particular element of the AAP concept that was most relevant to MOL: the idea and planning for an earth orbital workshop. The broad concept of AAP, however, in its early planning stages included using Apollo-Saturn hardware for many different types of missions. As it turned out, the workshop element of the AAP concept was the only one that survived. However, before the late 1960s, the workshop proposal was but one of many included in the overall AAP concept. For instance, an internal NASA document from October 1965 stated concerning AAP: "Basically, the objective is to acquire data and experience in earth orbit, in lunar orbit and on the lunar surface, by the early 1970's." It was hoped that AAP would lead in turn to space stations in earth orbit, lunar observatories, and manned planetary exploration in the 1970s and 1980s. Of the 254 experiments considered for AAP inclusion in this document, 20 were categorized as "lunar orbital survey" and 36 as "lunar surface exploration."¹¹⁶

1003002, AFHSO, 1; and AFRMO, Memorandum for the Secretary of the Air Force, DOD/NASA Space Station Study Coordination, IRIS 1002993, AFHSO, 1.

¹¹⁵ John M. Coulter, Colonel, Director of NASA Program Support Office of the Deputy Commander for Space, AFSC, USAF, and Benjamin L. Loret, Major, Systems Program Staff Officer for MOL, USAF, "Manned Orbiting Space Stations," in Eldon W. Downs, editor, *The U.S. Air Force in Space* (New York: Frederick A. Praeger, 1966), 37.

¹¹⁶ NASA, Office of Programming, Program Review Document, *Manned Space Science and Advanced Manned Missions*, October 7, 1965, shelf X-A-4, box: Program Reviews (November 23, 1963 - February 15, 1966), NHDRC, 35-37.

Similarly, in March 1966 Robert Gilruth, the Director of NASA's Manned Spacecraft Center mentioned two major clusters of experiments within AAP. First, there would be "follow-on lunar missions for exploration, mapping, and scientific studies" in which elements of the Apollo system would be modified. The Lunar Excursion Module would be changed so it could "be used as a shelter on the lunar surface." Second, there would be "earth orbital operations with remote sensors to observe surface phenomena and with optical and radio telescopes for outward observations, in addition to conducting experiments of medical or other scientific interest." In this case, Apollo items such as the Apollo Command Module would be updated to increase its earth orbital capabilities from 14 to 45 days.¹¹⁷ The point to remember is that while the orbital workshop concept within AAP that this dissertation will focus on because it was most relevant to MOL did turn out to be the only part of AAP that survived (as Skylab), until the late 1960s it was only one concept among many under the general rubric of AAP.

In November 1963, North American Aviation, the main NASA contractor for the Apollo capsule, issued a final study on modifying the Apollo spacecraft for extended earth orbital missions to experiment with unknowns such as prolonged exposure to weightlessness. The North American study explained how Apollo systems could be modified to meet the requirements of extended missions.¹¹⁸ NASA's official Skylab history stated that NASA began plans in 1964 to fly an Extended Apollo as its first space lab, designed to lead to an intermediate space logistics system and then finally a sophisticated space station.¹¹⁹ By August 1964 NASA's Manned Spacecraft Center in Houston proposed an Apollo X consisting of a modified Apollo lunar spacecraft to be used in Earth orbit for biomedical and scientific missions. In the

¹¹⁷ Robert R. Gilruth, Director, NASA Manned Spacecraft Center, Letter to George E. Mueller, NASA Associate Administrator for Manned Spaceflight, March 25, 1966, SPI document 363, pp. 1-2. For a detailed explanation of AAP's progress throughout the 1960s see W. David Compton and Charles D. Benson (*Living and Working in Space: A History of Skylab*, NASA SP-4208 (Washington, DC: USGPO, 1983), Part I; and Newkirk et. al., *Skylab: A Chronology*, supra, Part II.

¹¹⁸ Newkirk et. al., *Skylab: A Chronology*, supra, 28.

¹¹⁹ Compton and Benson, *Living and Working in Space*, 14.

first phase two humans would orbit for up to 45 days but by fourth phase three men would orbit for 120 days.¹²⁰

At this point McNamara apparently sensed enough NASA interest in earth orbital systems that he deemed it prudent to make another attempt for joint planning. He wrote Webb on September 25, 1964:

It is my understanding that your staff have been studying a configuration called APOLLO X planned as a possible forerunner to a National Space Station. I am also informed that NASA may tentatively plan to devote an appreciable amount to studies having a bearing on this matter in FY 1965, continuing an effort of approximately \$12 million committed to space station studies and related programs in FY 1964. . . . In view of the very large expenditures which would be involved in a National Space Station, its possible significance to national security as well as its importance to the country as a predecessor to manned planetary exploration, it seems to me that it may be timely to consider how we might jointly manage separate large programs.

McNamara specifically proposed a management plan based upon several principles. First, he and Webb would agree that MOL "is the flight forerunner to the definition of a scientific or militarily operational space station." Second, NASA would accept managerial responsibility for a program of scientific experiments to be flown on MOL, though the Air Force would continue as overall MOL program manager. Third, "Following flight results from the MOL, a determination will be made on (1) the necessity of a new large military operational or scientific space station, (2) the extent to which both scientific and defense needs might be met by a single operational program, and (3) the agency of the government that should carry the development responsibility."¹²¹

Webb would have none of it. He admitted that NASA studies had revealed that the Apollo spacecraft plus the Saturn 1B and Saturn V rockets would permit up to 100-day orbits without resupply or personnel transfer. He felt, however, that these studies had already been properly coordinated with the DoD in accordance with their space station agreement of the previous fall and the AACB channels specified therein. Webb believed the AACB coordination bodies "represent sound and adequate measures to insure the most effective and economical action in the area of manned space flight." Therefore,

It seems to me that we should not attempt rigidly to interpret or classify current programs in terms of possible undertakings in the future. . . . I view Gemini, Apollo, and the DOD MOL all as important contributors to the ultimate justification and definition of a national

¹²⁰ Newkirk et. al., *Skylab: A Chronology*, supra, 35.

¹²¹ McNamara, Letter to Webb, September 25, 1964, IRIS 1003002, AFHSO, 1-2.

space station. All are forerunners and precursors in this sense. While it is inevitable that there will be some duplicative capacity for experimentation in these three projects, each has its essential role in the national space program. . . . I believe that the predominant mission and objectives of a national space station, if and when justified, will in turn indicate which agency of the government should be designated to carry the primary responsibility for development and management.¹²²

Webb was arguing for the status quo. DoD would continue with the MOL and NASA would continue with its low-level AAP studies. That is exactly what transpired. NASA ceded no managerial responsibility to the DoD.

Seamans stated in late October 1964 that NASA planned to initiate program definition studies of an Apollo X spacecraft in FY65 but that a long duration space station program would not receive funding for actual hardware development until the 1970s.¹²³ An Air Force officer attended an AAP briefing the next month reported that NASA had prepared over 200 separate charts as part of a 23-volume study describing the specific modifications required of the Apollo capsule to extend its orbital life. He also said NASA's proposed schedule included the first of nine eventual launches in late 1968.¹²⁴ Associate Administrator for Manned Space Flight George Mueller told Congress early in 1965 that "Apollo capabilities now under development will enable us to produce space hardware and fly it for future missions at a small fraction of the original development cost. This is the basic concept in the Apollo Extension System (AES) now under consideration. . . . This program would follow the basic Apollo manned lunar landing program and would represent an intermediate step between this important national goal and future manned space flight systems."¹²⁵

On August 6, 1965 NASA established an official Saturn-Apollo Applications Program Office at its headquarters within OMSF and under the direction of USAF Major General David Jones, one of the

¹²² Webb, Letter to McNamara, October 14, 1964, IRIS 1002995, AFHSO, 1-3.

¹²³ Seamans in *Missiles and Rockets*, October 26, 1964, p. 14 as cited in Newkirk, et. al., *Skylab: A Chronology*, supra, 36.

¹²⁴ John J. Anderson, Colonel, AFRMO, Office of the Assistant for Manned Space Flight, Deputy Chief of Staff for R&D, USAF, Memorandum for Record, Apollo X Final Briefing, November 10, 1964, IRIS 1002995, AFHSO, 1-2.

¹²⁵ Mueller, to the House space committee, February 18, 1965, in Newkirk, et. al., *Skylab: A Chronology*, supra, 38.

many senior-ranking officer/managers the Air Force had on loan to NASA. By the end of the month, "Designers at MSFC [NASA's Marshall Space Flight Center in Huntsville, AL] began seriously to investigate the concept of a Saturn IVB-stage orbital workshop." On September 10, 1965, the Apollo Extension System was formally renamed AAP.¹²⁶ The workshop concept involved the conversion of a spent Saturn-IVB stage to a shelter suitable for extended stay and use by humans; in these early years it was thought this conversion would take place in-orbit.¹²⁷ One team of historians said NASA's early presentations of the AAP concept to Congress "found no enthusiasm for the program" because "The straightforward extension of Apollo's capability smacked too much of busywork - of 'boring holes in the sky.'"¹²⁸

NASA pressed on and in November General Jones solicited from the chief executives of the major American aerospace companies their views on NASA's proposed goals for AAP,¹²⁹ which at the time were simply described as using the Apollo and Saturn hardware for extended earth orbital experimentation "to develop operational equipment and techniques; to obtain direct benefits to man; and to conduct further scientific exploration in space."¹³⁰ NASA's Mueller characterized such generic descriptions of AAP: "This is suicide. You just can't get anybody interest in it. It's everything to everyone, but nothing that really grabs anyone." To which Seamans replied, "That's right."¹³¹ Nevertheless, in the fall of 1965 NASA's budget submissions for the first time included a separate line item for AAP,¹³² only a few weeks after Johnson gave final approval to MOL. The figure projected for FY66 was \$13.8 million, with \$83

¹²⁶ Linda Neumann Ezell. *NASA Historical Data Book, Volume III: Programs and Projects, 1969-1978*. NASA SP-4012 (Washington, DC: USGPO, 1988), 98.

¹²⁷ Newkirk, et. al., *Skylab: A Chronology*, supra, 47.

¹²⁸ Compton and Benson, *Living and Working in Space*, supra, 20.

¹²⁹ Newkirk, et. al., *Skylab: A Chronology*, supra, 55.

¹³⁰ Executive Office of the President, *US Aeronautical and Space Activities, 1965*, Report to Congress from the President, January 31, 1966, NSA MUS document 332, p. 17.

¹³¹ Oral history interview with Seamans, June 3, 1968, folder: Exit interview, Seamans subseries, Deputy Administrators series, NHDRC. 152, in which Seamans recalled Mueller's characterization and his response.

¹³² Levine, *Managing NASA in the Apollo Era*, 173.

million requested for FY67 and \$122 million for FY68.¹³³ As 1965 drew to a close AAP's status continued to be nebulous, as it was still just in the conceptual study stage.

The Execution of MOL and AAP

The final section of this dissertation will bring to a close the discussion of the MOL and AAP programs for the decade of the 1960s. Four issues will be examined. First, were MOL and AAP seen as duplicative by anyone, and, if so, did this impact the progress of either? Second and closely related, were there any attempts by the DoD or NASA at commonality concerning the use of either Apollo-Saturn hardware for MOL or MOL hardware for AAP? If not, why not? The final two sections will attempt to trace the respective histories of AAP through the summer of 1969 and the MOL through its cancellation during the same period just a month before the lunar landing in July.

Were MOL and AAP Duplicative?

Senator Clinton Anderson, Chairman of the Senate space committee, thought so. He wrote BoB Director Kermit Gordon in November 1964: "Unless the MOL is changed to some degree, the Air Force will spend a billion dollars on it and then have no place to go. We think the NASA and the DOD programs can be prepared to save a substantial part of this money, and that either the basic MOL or Apollo can be oriented into the first generation space platform."¹³⁴ The BoB's resulting report concluded that two orbital systems were not required. It said concerning the MOL: "Proceeding with the MOL does not now appear justified on the basis of the originally stated need for an experimental testing of the potential capabilities of manned space flight for high priority military purposes. The need for proceeding with the MOL is now very questionable in view of the diminished justification and the possibility of conducting experiments on most, if not all, of the problems of interest in due course with an extended Apollo system." If MOL continued, "It should be 'nationalized' and oriented to serve as a test vehicle for technical and scientific experiments of both military and general interest. In this role, it should have full and tangible

¹³³ Jane Van Nimmen, Leonard C. Bruno, and Robert Rosholt, *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 148.

¹³⁴ Clinton Anderson, Letter to Kermit Gordon, November 9, 1964, folder: Space Committee, MOL, box 915, Clinton Anderson papers, LoC, 1.

support of both NASA and the Department of Defense.” In the BoB’s assessment, another acceptable alternative would be, “Transfer the entire MOL program to NASA . . . with Defense to provide experiments of military interest in accordance with the present Gemini pattern.”¹³⁵

Concerning AAP the BoB was clear that it “. . . should not be justified on the general grounds of continuing the utilization of Apollo-Saturn capabilities beyond those being procured for the MLLP [Manned Lunar Landing Program].” Instead, it “. . . should be justified on a technical or other mission requirement basis in competition with other possibilities in the overall national space program and other demands on the Federal budget.” If the MOL proceeded the AAP should not duplicate any of its experiments but make use of the “special capabilities” of the Apollo-Saturn system. If the MOL was canceled, the AAP program should be reoriented to provide “. . . on a national basis the entire range of technological and scientific experiments of both military and general interest, on a schedule and plan that does not interfere with the MLLP.”¹³⁶ The BoB’s bottom line was clear: either the MOL or the AAP should be “nationalized” so it could meet both NASA’s and DoD’s needs, because the United States did not need two separate programs.¹³⁷ The White House’s Office of Science and Technology largely concurred: “It is important that there be either a single national orbital system capable of generating the data and experience required by all consumers or, if for various compelling reasons there need to be two such systems, their orbital capabilities should be complementary rather than largely overlapping.” Therefore, “It is not reasonable that both the MOL and the EAS systems (as currently defined) be approved for development and funded for FY 1966. . . .”¹³⁸ By the end of the month the trade press was declaring, “A merger of the

¹³⁵ BoB, Discussion paper, FY 1966 Budget Policy Considerations on Manned Orbiting Laboratory (MOL) and Extended Apollo Systems (EAS), November 19, 1964, folder: NASA/MOL, DoD subseries, Federal Agencies series. NHDRC, 7-8.

¹³⁶ *Ibid.*, 8-9.

¹³⁷ *Ibid.*, 10-11.

¹³⁸ Nicholas Golovin, Memorandum to Donald Hornig, Fiscal Year 1966 Budget Policy on MOL/EAS Programs, November 27, 1964, folder: Man in Space, 1964, box 401, RG 349, Records of the Office of Science and Technology, NARA, 4-5. Declassified at author’s request.

Air Force's Manned Orbiting Laboratory with the civilian agency's counterpart Apollo-based project is in the works."¹³⁹

A month after his letter to the BoB, Anderson wrote President Johnson with the same suggestion: cancellation of the MOL would save the United States \$1 billion over five years; in turn this money should be used to support NASA's AAP R&D.¹⁴⁰ It will be recalled from earlier in this chapter that in December 1964 the MOL program was officially reoriented to an operational, reconnaissance-gathering platform. It is possible that Anderson was briefed about this change and even that his campaign to merge MOL with AAP played a part in hastening the official designation of the MOL as an operational system and not an R&D test bed. Whatever the case, by the end of December Anderson announced that DoD and NASA had worked out an agreement that mollified his concerns: "The Department of Defense and NASA have gone a long way toward answering the questions I raised several weeks ago. . . . I have been told that the Air Force and NASA will take advantage of each other's technology and hardware development, with all efforts directed at achievement of a true space laboratory as an end goal."¹⁴¹ When asked about Anderson's desire to cancel MOL, McNamara responded, "I think Senator Anderson was simply emphasizing the absolute essentiality of fully coordinating the NASA and the Defense Department programs. With that, I agree 100 percent."¹⁴² The immediate controversy caused by the late 1964 Anderson letters and BoB analysis seemed to fade from that point.

The next major flashpoint in the MOL-AAP duplication discussion did not come until March 1966. The House Committee on Government Operations considered MOL and AAP and concluded.

The greatest potential for cost savings in this program . . . would come from NASA participation in the MOL program. Both agencies have talked about the possibility of accommodating NASA experiments on a noninterference basis on the MOL, but to

¹³⁹ "Washington Roundup, Space Lab Merger," *Aviation Week and Space Technology* (November 30, 1964): 17.

¹⁴⁰ Donald E. Fink, "Senate Space Head Pushes MOL Merger," *Aviation Week and Space Technology* (December 7, 1964): 16; and Newkirk, et. al., *Skylab: A Chronology*, supra, 37.

¹⁴¹ Clinton P. Anderson, Office of Senator, Press Release, December 20, 1964, folder: Space Committee, MOL, box 915, Clinton Anderson papers, LoC. 1.

¹⁴² McNamara, Transcript of News Conference, December 12, 1964, folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA, 2.

date little has been done to achieve this goal. Instead, NASA is proceeding with its plans for a similar near-earth manned space project which also will explore the effects on man of long duration space flights. . . . Despite the fact that Apollo Applications is not considered an approved program, there is the danger that both agencies soon will reach a point of no return where separate and largely duplicating programs cannot be avoided.

Inasmuch as both programs are still research and development projects without definitive operational missions, there is reason to expect that with earnest efforts both agencies could get together on a joint program incorporating both unique and similar experiments of each agency. . . . Such a step would without question save billions of dollars.

This particular committee concluded the MOL could fulfill both NASA and DoD requirements: "A soundly conceived MOL with carefully devised experiments can serve both military and civil space requirements." NASA's merging of its earth-orbital requirements into MOL should be "effected within the existing scale of priorities which accords to the military experiments greater urgency."¹⁴³

The BoB dutifully requested NASA prepare a study to see if AAP could be designed around the MOL-Titan IIIM system. As Arnold Levine related, "Predictably, NASA concluded that it could not, since its current programs were adequately supported by existing vehicles."¹⁴⁴ Samuel Phillips attempted to explain the difference between MOL and AAP and indirectly showed the difficulty of doing so because of his inability to touch upon MOL's reconnaissance central mission: "The MOL objective is to develop manned orbital capabilities for accomplishing uniquely military tasks in narrowly constrained, low altitude earth orbits. . . . AAP, on the other hand, is planned to extend the technology and experience of the Gemini and Apollo programs by conducting experiments not only in a wide range of low earth orbits but also in earth-synchronous and lunar orbits and on the lunar surface."¹⁴⁵ Many policy makers were likely to ask if that distinction merited hundreds of millions of dollars and perhaps several billion in additional expenditures. Nevertheless, by the summer of 1966 Humphrey declared, "There already exists a high de-

¹⁴³ Congress, House, Committee on Government Operations, *Missile and Space Ground Support Operations*, Report No. 1340, 89th Congress, 2nd Session, March 21, 1966, pp. 46-47.

¹⁴⁴ Levine, *Managing NASA in the Apollo Era*, 255.

¹⁴⁵ "Interview of Samuel Phillips." *Data* (April 22, 1966): 11. As mentioned above lunar orbital and lunar surface missions were studied during the early stages of AAP planning. However, by mid-1969 at the latest these efforts died as it became clear that political support for and funding of AAP would be extremely limited and that AAP would consist mostly of an earth orbital workshop.

gree of cooperation between the Air Force and NASA in the MOL program, and I expect it will continue. I have no reason to predict an actual merger of the MOL research and development effort with any of NASA's manned projects."¹⁴⁶ When asked in the fall if there was any possibility that the MOL would be merged with any competitive NASA programs, Undersecretary of the Air Force Normal S. Paul replied, "Not the slightest possibility."¹⁴⁷

The Undersecretary's assessment seemed to be correct, though for unstated reasons. The MOL was conceived, designed, and its experiments focused on the particular challenges of gathering intelligence information from space. It was, therefore, part of the nation's top secret but high priority overhead reconnaissance program. Given the likely delay that would result from merging it with AAP or having to incorporate AAP experiments and hardware into MOL, there was little realistic chance either system would be merged with the other. Therefore, while the MOL's reconnaissance mission may have given it a degree of "immunity" from being merged into AAP, the unfortunate flip side was that this reconnaissance mission could not be publicly discussed, nor could it even be revealed beyond a close circle of top-level national policy makers. This meant charges of duplication continued to be raised by various parties who were probably unaware of the national security imperatives behind MOL's reconnaissance tasking.

In fact, Vice President and NASC Chairman Hubert Humphrey asked a pointed question to Deputy Secretary of Defense Paul Nitze in a November 1967 NASC meeting: "How do we explain to the public the difference between MOL and AAP? Nitze responded that MOL is a military experiment and people understand fairly well that we do not talk publicly about military experiments." Another DoD official added that since the first manned MOL launch had slipped until 1971 "we have until then to decide how much and what to tell the public."¹⁴⁸ In other words, the United States government should continue to tell the public virtually nothing about MOL, as it had for most of MOL's existence already. The price

¹⁴⁶ "Humphrey: 'Space Program is Here to Stay.' An Exclusive Interview." *Technology Week* (September 5, 1966): 13.

¹⁴⁷ NASA, *Astronautics and Aeronautics, 1966: Chronology on Science, Technology, and Policy*, NASA SP-4007 (Washington, DC: USGPO, 1967): 323.

¹⁴⁸ NASC, Summary Minutes, NASC Meeting, November 14, 1967, folder: NASC Meeting, November 14, 1967, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA, 4.

the DoD and the Air Force would pay for continued silence would be continued erosion in support for MOL in Congress and elsewhere because the DoD could not or would not explain its central justification: reconnaissance.

NASA tried to urge groups such as PSAC, which had recommended closer MOL-AAP integration, to compare the actual designs of MOL and AAP in an attempt to objectively determine if one could do the mission of the other. NASA believed if the critics charging duplication did so, these charges would wane. NASA explained in January 1968 that PSAC's recommendation that AAP's objectives be merged into MOL "... does not appear to be a sensible approach. In the first place, we have given serious and repeated study to the use of MOL for NASA manned earth orbital missions as an alternative to the first set of AAP missions. In this context, the MOL fell far short of accommodating the minimum required experiments and goals that had been planned for AAP. In addition, the use of MOL for the AAP missions would be more expensive. To consider MOL as a follow-on to the first round of AAP just doesn't make sense."¹⁴⁹ NASC Executive Secretary Welsh helped in the effort to clarify the MOL versus AAP question. He told the House that the NASC had examined both systems in detail "to see if they had the same experiments on board both. We found they do not have the same experiments on board" though neither was yet operational. "Also," Welsh continued, "They are not designed to develop the same information."¹⁵⁰ Webb also tried to make this point without mentioning the reconnaissance-oriented nature of MOL:

The thing that the Manned Orbiting Laboratory is attempting to find out is whether a man will contribute more military information up there than an instrument, and do the job better across the board. If they find he won't, there won't be any more of that, I am sure. However, in contrast with the Apollo Applications Program, the MOL's going into different orbits. They have different missions and look down on different areas. The military mission for the Apollo Applications Program is about zero. For the MOL it is about 100 percent. I think you can note the absence of duplication for military purposes. One of the things the AAP does is look out into space for astronomy purposes, not looking down at earth all the time. . . . There are some 87 experiments on board the Apollo Applications Program, none of which duplicate the experiments that

¹⁴⁹ NASA, Position Paper on the Report of the Space Panel of the President's Science Advisory Committee, January 26, 1968, folder: PSAC Correspondence, 1968, box: White House, President's Science Advisory Committee, NHDRC, 6.

¹⁵⁰ Welsh to the House Appropriations Committee, February 5, 1968, excerpted in NASC document, Selected Congressional Testimony - 1968, folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA, 50.

are in the MOL program.¹⁵¹

These were difficult distinctions to make but apparently NASA made them well enough to ensure that its AAP was not folded into MOL. At times Webb faced incredulous congressmen. Also in February 1968 he appeared before the House space committee and was asked by Representative William Fitts Ryan if there had been any "serious study of whether the two programs should be combined in an effort to avoid duplication." Webb replied, "There is no duplication that is not important in the development of the space capabilities of this Nation, between the Manned Orbiting Laboratory and the Apollo Applications Program. . . . There is no meaningful comparison between a Saturn V launched workshop and a Titan III launched Manned Orbiting Laboratory." When Ryan continued to maintain there was obvious duplication, Webb reiterated, "The fact a man may be orbiting in a military spacecraft and another man orbiting in a NASA spacecraft in my view is not duplication of a kind that should be considered unwise." Chairman George Miller then interrupted, "I agree with you, and I don't think we will go into it any further."¹⁵² DoD officials did not offer a great deal of comment or testimony on the question of MOL versus AAP. Perhaps they were confident of continued MOL survival and autonomy because of its intelligence-gathering *raison d'être*.

The administration's position remained clear. Welsh wrote the vice president in March 1968 after researching the MOL versus AAP question in the Pentagon and NASA Headquarters and explained to Humphrey, "I was assured in both instances that there is no program for merging AAP and MOL and there is no program for joint operation of a manned workshop."¹⁵³ NASC supporting material tried to highlight some of the differences between MOL and the earth orbital workshop portion of AAP: AAP would fly 87 experiments but MOL only a very few due to its military mission; AAP was expected to have the ability to accomodate nine men to MOL's two, have a 22' diameter to MOL's 10, have 10 times

¹⁵¹ Webb to the House Appropriations Committee, February 5, 1968, *ibid*.

¹⁵² Congress, House, Committee on Science and Astronautics, *NASA Authorization, 1969*. Hearings, part 1, 90th Congress, 2nd Session, February 1968, 97-98.

¹⁵³ Welsh, Memorandum for the Vice President, March 4, 1968, folder: National Aeronautics and Space Administration, 1967 & 1968, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

MOL's internal volume and sustain humans for 90 days to MOL's thirty; and MOL's single aim was to advance specialized military missions "which almost completely absorb its capacity" while AAP was aimed at the broad development of human spaceflight for the 1970s.¹⁵⁴ As George Mueller told the Senate space committee on April 19, 1967, "The programs are not directly related."¹⁵⁵

Nevertheless, the question remained open in the minds of some, the BoB in particular. Its October 1968 briefing on the nation's space program designed for the incoming administration stated, "A major policy problem concerns the future of earth orbital manned space flight in which DOD now has the Manned Orbiting Laboratory and NASA has the Apollo Applications Program. In future, should we plan on two manned programs, a single program jointly run, or should a single agency be assigned responsibility for all manned space flight activities?"¹⁵⁶ Charges of duplication continued to flow from some Congressional quarters. Representative James Fulton stated in 1968 that MOL and AAP should be merged and placed under NASA's aegis and it was reported he was prepared to reissue this call in 1969. Fulton believed that due to reasons of "prudent management and good judgment" a single program should be created. He was characterized as "annoyed" by the secrecy surrounding the MOL, saying, "It's so super secret, members of the committee don't know what's going on." Welsh could only reply, "To combine these projects would be more expensive, not less; and less efficient, not more."¹⁵⁷ NASA's official response to Fulton was, "The NASA Apollo Applications Program and Air Force MOL Program have different objectives, require different orbits, and the equipment and supporting facilities of each are designed to meet the separate purposes of each program. We do not believe it is practical or prudent to merge the two programs. The end result would result in a compromise spacecraft unable to satisfactorily meet the

¹⁵⁴ R.V. Mrozinski, NASC, Memorandum to William Moore, Director of Technical Staff, NASA, April 1, 1968, folder: MOL 1968 & 1969, DoD subseries, Federal Agencies series, NHDRC, 1.

¹⁵⁵ Cited in Kennan and Harvey, *Mission to the Moon*, 204.

¹⁵⁶ BoB, Report, National Aeronautics and Space Administration: Highlight Summary, October 30, 1968, *Exploring the Unknown, Volume I*, 499.

¹⁵⁷ "Air Force Orbit Plan is Attacked," *Baltimore Sun*, January 30, 1969, p. 8A.

primary objectives of either program. . . . cost savings could not be achieved by merger or more extensive use of joint elements in the MOL and AAP programs."¹⁵⁸

Use Apollo-Saturn Hardware for MOL or Vice Versa?

A closely related question was why could not the DoD use NASA's pre-existing Apollo-Saturn hardware for its MOL? Or, conversely, why could not NASA use the hardware that DoD was developing with the Gemini B-MOL-Titan III combination to conduct the experiments it wanted to do in the AAP? This question is differentiated from the duplication question in that the duplication issue focused on whether or not one entire system should be merged with the other. The hardware question presumed both systems would continue to exist but asked why could not one system make greater use of the other's equipment? The answer is that numerous studies, investigations, and queries were made into this question but neither DoD nor NASA ever took any substantial action. Both agencies offered justification for proceeding with their separate programs with distinctive hardware configurations in each.

One NASA official involved with early studies on potential MOL-AAP continuity reported in August 1964, "The Air Force is not interested in the Apollo for MOL because they believe the program will slip and also they cannot count on the availability of hardware for their program."¹⁵⁹ Given the national priority accorded the lunar landing program, and then the Apollo fire in January 1967, there was some legitimacy to these concerns. While the Air Force may not have desired to step back from its Gemini B-MOL-Titan IIIM configuration, there are hints of numerous studies throughout the mid- and late 1960s investigating the possibility of using Apollo-Saturn hardware for MOL objectives. For instance, the Aerospace Corporation, a company which conducted various types of future studies as well as systems analysis for the USAF, in 1964 conducted an MOL-AAP study that described four basic Apollo configurations, three of which would accomplish the MOL mission. It added, "However, it is doubtful that NASA

¹⁵⁸ Robert F. Allnutt, Associate Administrator for Administrative Affairs, NASA, Letter to Representative James G. Fulton, April 1, 1969, folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC, 3-4.

¹⁵⁹ Edward Z. Gray, Director for Advanced Manned Missions Program, NASA, Letter to George Mueller, Associate Administrator for Manned Space Flight, August 31, 1964, folder: NASA-DOD, box: Arnold Levine, Selected Sources from the author, NHDRC, 1.

would agree to the Air Force use of Apollo except on a strict non-interference basis." The potential for delaying the MOL program by redesigning it to use Apollo-Saturn hardware also concerned the Air Force because North American Aviation, the prime Apollo contractor estimated the earliest delivery date for an Apollo-based MOL would be 36 months after go-ahead and AFSC's Space System Division "considers this to be optimistic since a new production line would have to be established and would not interfere with Apollo production."¹⁶⁰

The Air Force regularly pledged that it would continue to "... assess the Gemini B/Laboratory Module/Titan IIIC configuration and configurations of the Apollo system to determine which would satisfy the objectives in the more efficient, less costly, and more timely fashion."¹⁶¹ But each time the status quo won out: MOL continued to be defined as it had been in its original design. The history of NASA studies on using MOL equipment for AAP's objective was much the same: numerous and continuing studies were conducted and often stated that MOL could accomplish most of AAP's missions. But in response NASA would justify continuing to use the Apollo-Saturn equipment and not revert to Gemini and a DoD-developed laboratory cylinder.

Even when the DoD and NASA got together within the AACB to study the entire launch vehicle fleet including every conceivable combination of not only Titans and Saturns but also the Thor, Delta, Atlas, Agena, and Centaur vehicles, no radical changes were recommended. After an extensive study in 1964 the AACB's Launch Vehicle Panel in December stated, "There is not a decisive difference between the total costs of the launch vehicle options considered in this study for either the maximum or minimum values of the mission model. . . . Cancellation at this time of entire Atlas, Titan or Saturn launch vehicle families . . . would not result in cost savings significant within the accuracy of the study. . . . the potential cost advantages to be obtained from substituting one booster for another, either entirely or in specific pro-

¹⁶⁰ Excerpts from a report by a Mr. Strible from the Aerospace Corporation, in Howard S. Davis, Lieutenant Colonel, AFRMO, USAF, Memorandum for Record, MOL Presentation to Dr. Hall, DDR&E, October 8, 1964, IRIS 1002995, AFHSO, 2.

¹⁶¹ Kenneth W. Schultz, Colonel, Assistant for Manned Space Flight, Office of the Deputy Chief of Staff for R&D, USAF, Congressional Preparation Instruction # 7, November 27, 1964, IRIS 1002995, AFHSO, 10.

grams, may sometimes be illusory." In fact, the AACB study concluded, "The most striking result is the fact that so little difference in cost exists between options. . . . There is not a significant difference (less than 1%) between the total costs of the launch vehicle options considered."¹⁶² Given that its primary coordination mechanism did not exert pressure to pare the launch vehicle fleet, it comes as little surprise that the Air Force had no desire to use the Saturn for MOL, nor that NASA wanted to avoid incorporating the Titan III into AAP.

Nevertheless, the studies continued. Webb and McNamara jointly pledged in January 1965: "DOD, with assistance from NASA, will compare configurations of Apollo which may be suitable for military experiments with the Gemini B-MOL configuration to determine the complete system that can meet the primary military objectives in a more efficient, less costly, or more timely fashion."¹⁶³ Each time, the Air Force would reply that it had investigated "adapting Apollo to accomplish the MOL objectives" but that,

Our preliminary studies have shown that the development of such a laboratory program would cost more than the Gemini B/MOL and that a laboratory would not be available any sooner than the Gemini B/MOL. Even if NASA were to build an Apollo laboratory and to agree to perform DOD experiments on a priority with theirs, the arrangement would not satisfy all military objectives for a laboratory program. The military must develop and test its systems; we cannot gain operational experience in space by watching over the shoulder of the people who are planning, developing, directing, and conducting space programs.¹⁶⁴

All in all, the Air Force concluded, "The Gemini/MOL configuration offers a more advantageous route to a space laboratory than does the modified Apollo"¹⁶⁵ because "this redevelopment of the Apollo lunar

¹⁶² AACB, Launch Vehicle Panel, *Study of DOD and NASA Launch Vehicle Requirements*, no folder, box: Aeronautics and Astronautics Coordinating Board # 3, NHDRC, 2, 4-5, 78-79.

¹⁶³ McNamara and Webb, Joint Statement, Decisions on Manned Orbiting Laboratory and Related Matters," January 25, 1965, folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA, 3.

¹⁶⁴ Office of the Assistant for Manned Space Flight (AFRMO), Office of the Deputy Chief of Staff for R&D, USAF, Congressional Preparation Instruction # 14, January 26, 1965, IRIS 1002996, AFHSO, 2-3.

¹⁶⁵ Office of the Assistant for Manned Space Flight (AFRMO), Office of the Deputy Chief of Staff for R&D, USAF, Unclassified Supporting Witness Statement, Manned Space Programs, March 9, 1965, IRIS 1002996, AFHSO, 7.

hardware would probably cost more, would not produce a laboratory faster, and the resultant laboratory would offer no functional advantages over the Gemini/Titan III/MOL.”¹⁶⁶ Therefore, the idea of conducting a radical redesign of the MOL so its objectives could be met using Apollo-Saturn hardware never progressed beyond the study stage within the Air Force or OSD.

NASA’s studies of using Gemini B-MOL hardware to meet AAP’s objectives followed much the same dynamic as did the USAF’s studies of using Apollo-Saturn hardware to meet MOL’s objectives. NASA’s basic conclusion was:

We certainly support the fundamental concept that NASA should make the maximum effective use of all available technology in carrying out the U.S. objectives for manned space flight. However, the practical problems of NASA conducting manned space flights with two separate booster-spacecraft-ground support systems would require significant increases in NASA resources, particularly in manpower. NASA’s goals will require the use of Apollo-Saturn systems, regardless of MOL availability, for missions in: a. Earth synchronous orbits; b. Low earth orbits; c. Lunar exploration. The MOL system will not have adequate performance for such missions.

NASA explained that the MOL could conduct only five of NASA’s twelve planned earth orbital missions and none of the lunar and planetary type of operations.¹⁶⁷ Therefore, proposals for using MOL equipment for AAP missions made little headway within the NASA hierarchy. As Seamans explained to Albert Hall in the Office of the DDR&E, “The Saturn-Apollo system designed for lunar exploration has inherent capabilities beyond those required for the MOL” and so NASA could really not adapt MOL for AAP use. Conversely, “These capabilities make an Apollo-based system more expensive than a Gemini-based system for the program now contemplated” and so DoD would probably not want to refashion Apollo-Saturn equipment for MOL use.¹⁶⁸

¹⁶⁶ Office of the Assistant for Manned Space Flight (AFRMO), Office of the Deputy Chief of Staff for R&D, USAF, Unclassified Supporting Witness Statement, April 1965, IRIS 1002996, AFHSO, 1.

¹⁶⁷ Edward Z. Gray, Memorandum to W. Fred Boone, Response to Space Council’s Questions on MOL, July 21, 1965, folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC, cover letter p. 1, and separate page answer to NASC question # 5.

¹⁶⁸ Seamans, Memorandum to Dr. Albert C. Hall, Deputy Director for Space, DDR&E, Proposed answers to potential queries on the MOL program, August 5, 1965, safe # 1, drawer 2, folder: MOL/AES, NHDRC, 1. Declassified at author’s request.

One AAP history stated that NASA found "... good reasons for not conducting its AAP program aboard the Air Force laboratory. The basic MOL configuration was inadequate to meet AAP goals, while a DoD proposal for a larger MOL would take four years to develop and cost an additional \$480 million in facility modifications. Even then, OMSF calculated, to achieve the same results, an uprated MOL program would cost more annually than the Saturn IB and Apollo." Costs to integrate the MOL and AAP systems as of 1966 were estimated at \$250 million and would require 3.5 years; therefore, 17 launches would be required just to pay back the conversion costs.¹⁶⁹ NASA's position throughout the late 1960s remained firm: "Introduction of either the Titan IIIM launch vehicle or the Titan IIIM/MOL systems into the post-Apollo manned space flight program is neither technically desirable nor cost effective. Such action could jeopardize the possible U.S. position in space by delaying for almost three years the low earth orbital application of proven U.S. space technology. Thus, continuation of the Saturn I-Apollo system for AAP missions is in the best national interest."¹⁷⁰ NASA explained it had extensively studied the issue of using the MOL system for AAP experiments but its studies "have indicated that using the Titan III/MOL would cost over \$500 million more during the next five years than using the Saturn I/Apollo combination." In addition, the Apollo-Saturn system would be available "several years earlier" than a modified MOL.¹⁷¹

NASA stuck by these conclusions through the rest of MOL's existence, despite studies from MOL's prime contractor that the MOL could, with relatively minor modifications, be easily adapted to perform all of NASA's biomedical and behavioral assessments of humans in space for up to a year at a time and 85 percent of the engineering and scientific experiments. Douglas Aircraft's Missile and Space Systems Division stated, "It is concluded that use of MOL-derived hardware is conceptually feasible and

¹⁶⁹ Compton and Benson, *Living and Working in Space*, *supra*, 47-48.

¹⁷⁰ NASA, Internal Position Paper, NASA Position Summary on Saturn I/Apollo vs. Titan III/MOL for the Apollo Applications Program, January 6, 1967, folder: NASA-MOL, DoD subseries, Federal Agencies series, NHDRC, 4.

¹⁷¹ Richard L. Callaghan, NASA Associate Administrator for Legislative Affairs, Letter to Representative Lester L. Wolff, March 29, 1967, folder: USAF Manned Orbiting Laboratory, DoD subseries, Federal Agencies series, NHDRC, 1.

cost effective in accomplishing early NASA objectives" and that "Existing MOL facilities and equipment for manufacturing and subassembly of the NASA space station could be made available without interference to the Air Force MOL program."¹⁷² NASA was not swayed. It continued to maintain that switching from an Apollo-Saturn AAP to one employing Gemini-MOL-Titan III equipment would be much more expensive, would entail at least a three-year delay in the program, and would not be as capable as the original AAP design.¹⁷³

As yet another in the seemingly interminable series of MOL-AAP studies was taking place in late 1968, the NASA and DoD representatives probably summarized the entire process best: "NASA and DOD have, over the years, made a number of studies relating to the use of APOLLO derivative hardware for MOL missions or MOL hardware for AAP missions. These studies have generally been nonconclusive or have reached negative conclusions for reasons of schedule or costs or unable to meet technical requirements." However, "Under today's conditions of drastically reduced funding for both programs and the resulting slipped schedules, it is desirable to re-examine the possible utilization of hardware from one or the other of these programs to meet the goals of both."¹⁷⁴ Given the fact that this very question had been studied since at least 1964 and that within ten months the MOL would be canceled, this latest study effort had little impact. In fact, none of these studies led to any appreciable progress toward common NASA-DoD use of AAP-MOL hardware before MOL's June 1969 cancellation.

¹⁷² Douglas Missile and Space Systems Division, DAC-58060, *Evaluation of the Usefulness of the MOL to Accomplish Early NASA Mission Objectives, volume 1, Summary*, October 1967, multiple folders labeled: NASA-MOL, DoD subseries, Federal Agencies series, NHDRC, 1-2, 33. This summary volume was part of a ten volume comprehensive study Douglas did on the question of NASA using MOL for early AAP missions. In addition, Douglas completed another multivolume study in July 1968 on the ability of its MOL to meet NASA's intermediate and long term AAP goals and concluded: "MOL can accomplish intermediate objectives for the NASA. Extended durations up to 90 days are feasible without major redesign. A NASA MOL could be available in 1972." Douglas Missile and Space Systems Division, *NASA Use of MOL for Extended Orbital Missions*, July 1968, multiple folders labeled: NASA-MOL, DoD subseries, Federal Agencies series, NHDRC, no page numbers provided.

¹⁷³ NASA, OMSF, Report, *Complementary Nature of AAP and MOL Programs?*, June 10, 1968, folder: Comparison of AAP and MOL, box 114, James Webb papers, HSTL, passim.

¹⁷⁴ DDR&E John Foster and NASA Associate Administrator Homer Newell, *Terms of Reference, NASA-DOD Review of Manned Space Flight Programs*, August 6, 1968, folder: NASA-DOD Agreements, box 10, RG 220, Records of the National Aeronautics and Space Council, NARA, 1.

AAP's Progress through 1969

The AAP's path from 1966 through 1969 was one dictated by budgetary stringency. By the end of this dissertation's time frame it had progressed only to the point where the NASA Administrator had approved a final design. Construction had not begun and no launches would in fact take place until 1973. Therefore the story of AAP through 1969 is essentially one of financial struggle and design work. In February 1966 Seamans outlined to Congress that the basic thrust of AAP was to extend earth orbital stay-times to 45 days or more through minor modifications of the present Apollo system but that, "We cannot today look toward a permanent manned space station, or a lunar base, or projects for manned planetary exploration until our operational, scientific and technical experience with major manned systems already in hand has further matured."¹⁷⁵ Whereas NASA requested \$250 million for AAP in FY67, it received only \$50 million.¹⁷⁶ Given these limitations, Seamans met with NASA's program directors and outlined the three cardinal AAP tenets in March 1966. First, the lunar landing remained NASA's top priority and must not be compromised by any AAP activity. All changes to Apollo hardware for AAP had to be approved by Webb or Seamans; so did any AAP procurement actions. Finally, any submitted AAP experiment had to have a "clear and defensible rationale."¹⁷⁷ This was not a recipe for a vibrant and flourishing program.

The first official NASA AAP schedule was also released in March 1966 and was surprisingly ambitious. It envisioned 26 Saturn IB and 19 Saturn V AAP launches with the first launch scheduled for April 1968.¹⁷⁸ These launches would include three orbital workshops based on conversion of spent Saturn-IVB stages, three Saturn-V orbital labs and four Apollo Telescope Mounts (ATM), which was a hu-

¹⁷⁵ Seamans to the House space committee, February 18, 1966, in Newkirk et. al., *Skylab: A Chronology*, supra, 66.

¹⁷⁶ R.W. Hale, NASC, Memorandum for Edward Welsh, NASC Executive Secretary, March 7, 1966, Space Council Meeting, March 3, folder: NASC Meeting, March 3, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA, 2.

¹⁷⁷ Newkirk et. al., *Skylab: A Chronology*, supra, 68.

¹⁷⁸ As explained above, these large numbers were partially explained by the fact that in 1966 AAP still included lunar orbital and lunar surface missions as well as earth orbital ones. By 1969 AAP had become a single mission project: an earth orbital workshop.

man-tended astronomical observatory designed to study the sun and other celestial bodies. However, by January 1968 this formidable schedule had already been scaled back to three Saturn-IB launches, three Saturn V launches, one Saturn-IB orbital workshop, one Saturn V orbital laboratory, and one ATM, with the first launch scheduled for April 1970.¹⁷⁹ During 1966 and until mid-1969 it remained undecided if these workshops would be "wet" or "dry." "Wet" workshops would be created from the spent stages of launched rockets with which astronauts would rendezvous and dock and outfit as an orbital laboratory. "Dry" workshops would be fully constructed and equipped on the ground, launched into space, and then receive the subsequently-launched astronauts.

Whatever the workshop's configuration, one scholar stated, "All were subjected to very sharp criticism from NASA officials, from Congress, from the Bureau of the Budget, and from various scientific advisory groups." NASA's own Associate Administrator for Space Science and Applications Homer Newell in June 1966 pointed out "... the lack of a substantial, visible end product to serve as a focus for the effort. After four or five years of activity, NASA will have spent many billions of dollars and have relatively little to show for it. . . . [AAP] as now configured just doesn't seem to justify such high costs for an extended period."¹⁸⁰ NASA did its best to succinctly define AAP's goals but its attempts paled when compared to the goal "before this decade is out, of landing a man on the moon and returning him safely," Kennedy's Apollo tasking in May 1961. For instance, "The basic purposes of the Apollo Applications Program are to continue without hiatus an active and productive post-Apollo program of manned space flight, to exploit the capabilities of the Saturn Apollo system for useful purposes and to effect a progressive development of these capabilities as a stepping stone to whatever programs lie in the future."¹⁸¹

Some of the consultants Webb retained outside of the NASA framework tried to convince him of the inadequacy of such definitions, and indeed, the underlying AAP philosophy they reflected. Said one,

¹⁷⁹ Linda Neumann Ezell, *NASA Historical Data Book, Volume III: Programs and Projects, 1969-1978*, supra, 98; and Newkirk et. al., *Skylab: A Chronology*, supra, 126.

¹⁸⁰ Levine, *Managing NASA in the Apollo Era*, 248. Newell citation from same location.

¹⁸¹ NASA Budget Submittal to the BoB, November 1, 1966, cited in Emmette S. Redford and Orion F. White, *What Manned Space Program After Reaching the Moon?: Government Attempts to Decide, 1962-1968* (Syracuse, NY: The Inter-University Case Program, January 1971), 189.

"There is no valid requirement for 'applying' certain technologies just because they were developed by Apollo. Each space project has to justify itself on the basis of its merit - whether it is related to Apollo or not. . . . The immediate problem is to extricate NASA from the pitfall of trying to present an unconvincing concept."¹⁸² AAP's budgetary history suggests, however, that this never happened. As Lambright noted, "Under the impact of budget cuts, redesign became a way of life for AAP."¹⁸³

Webb entered the FY69 budget cycling requesting that the BoB and President Johnson authorize \$652 million for AAP. BoB approved a request of \$454 million but then Congress appropriated first only \$253 million and subsequently reduced this to \$150 million.¹⁸⁴ The result was the downsizing and schedule slippage described above. In February 1968 Webb declared concerning AAP, "Our progress to date has been limited by the need to hold down expenditures in FY 1968 and those projected for FY 1969. . . . The amounts provided . . . will barely keep the program alive."¹⁸⁵ Accordingly, Webb implemented an AAP holding plan for the remainder of FY68 "in order to maintain a reasonable balance in program content while avoiding major cuts to work in progress. This action became necessary because of funding restraints imposed on AAP."¹⁸⁶ When finally calculated in terms of direct NASA obligations, AAP's funding history was as follows, in millions of dollars: 1966 - 13.8; 1967 - 83.4; 1968 - 122.2; 1969 - 150.¹⁸⁷

¹⁸² C.P. Cabell, Consultant to the Administrator, Memorandum, Presentation of A.A.P. Objectives, December 21, 1966, folder: Apollo-AAP Planning, Skylab series, NHDRC, 1-2.

¹⁸³ W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 194.

¹⁸⁴ Roger E. Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990*, NASA SP-4406 (Washington, DC: USGPO, 1989), 81; Levine, *Managing NASA in the Apollo Era*, 258; and Lambright, *Presidential Management of Science and Technology*, 148.

¹⁸⁵ James Webb, Statement to the Senate Appropriations Committee, Subcommittee on Independent Offices, May 17, 1968, folder: Subcommittee on Independent Offices, May 1968, box 155, James Webb papers, HSTL, 10.

¹⁸⁶ Newkirk et. al., *Skylab: A Chronology*, supra, 136.

¹⁸⁷ Van Nimmen et. al. *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, supra, 156; and Ezell, *NASA Historical Data Book, Volume III: Programs and Projects, 1969-1978*, supra, 63.

The final AAP development relevant to this dissertation's time frame was NASA Administrator Thomas Paine's decision on July 18, 1969 to officially approve the shift from a "wet" to a "dry" orbital workshop concept for AAP. AAP would feature one space laboratory constructed on the ground, equipped with one ATM, and launched by one Saturn V. Three-person crews would subsequently be orbited by a Saturn IB and dock with the workshop for the rest of their tour and then return in the Apollo capsule upon completion. This meant the program consisted of four launches: one Saturn V to launch the workshop and ATM and three Saturn IBs to launch the three separate sets of astronauts that would inhabit it. The schedule included a first launch now slipped to July 1972.¹⁸⁸ AAP would be officially rechristened Skylab on February 17, 1970.¹⁸⁹ It was not, in NASA's opinion, "... the versatile and long-lasting station that NASA had planned since the 1950s. Designed to satisfy the institutional need to do something after Apollo and to keep the NASA team together long enough to finish the lunar landing missions, Skylab was makeshift and temporary. NASA's space station engineers, in fact, deliberately built the station without the thrusters necessary to keep it in orbit for any significant amount of time" because "they hoped to ensure the construction of a more permanent and sophisticated station."¹⁹⁰

It is impossible to know with confidence if the reason Skylab survived was MOL's cancellation. Whatever the case, the \$2.6 billion¹⁹¹ Skylab program was the closest the United States would get to a space station. The 100-ton workshop was launched into orbit on May 14, 1973 and marked the last time the giant Saturn V was used. The first crew of three astronauts joined it on May 25 and after repairing some damage caused to the laboratory during its launch the crew stayed in orbit for 392 hours before re-

¹⁸⁸ Thomas Paine, Letter to Clinton Anderson, July 22, 1969, folder: Space Committee, General, 91st Congress, box 921, Clinton Anderson papers, LoC, 1; and Newkirk et. al., *Skylab: A Chronology*, supra, 167.

¹⁸⁹ Ezell, *NASA Historical Data Book, Volume III: Programs and Projects, 1969-1978*, supra, 100.

¹⁹⁰ James R. Hansen, *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo*, NASA SP-4308 (Washington, DC: USGPO, 1995), 270.

¹⁹¹ Ezell, *NASA Historical Data Book Volume II*, supra, 121.

turning on June 22, 1973.¹⁹² The second set of three astronauts occupied Skylab for 59 days starting July 28, 1973 and the third for 84 days starting November 16, 1973.¹⁹³ In total the crews occupied Skylab for 171 days and 13 hours while conducting almost 300 scientific and technical experiments.¹⁹⁴ However, probably the most coverage the workshop ever received was when it reentered the earth's atmosphere: "In 1979, Skylab did fall to earth and made more news as a burning hunk of metal than it ever did as an operating space laboratory."¹⁹⁵ As will be seen below, the MOL never received even that transitory amount of publicity.

The MOL from Presidential Approval to Presidential Termination

Less than a month after Johnson official approved of MOL construction in August 1965 the press was already speculating about the competition it faced, not from NASA, but from NRO's reconnaissance satellites. *Newsweek* said the Air Force was concurrently developing a ten-ton unmanned reconnaissance satellite "... stuffed with cameras, sensors and detectors, and possibly capable of maneuvering in orbit Such a surveillance system could conceivably give MOL stiff competition."¹⁹⁶ Indeed, it would take almost four years, but shortly after Nixon's assuming office the combination of three factors led to MOL's demise: perceived duplication with NASA's earth orbital programs; perceived duplication with NRO's reconnaissance satellites (both described above); and continued government-wide financial pressures resulting from persistent Vietnam War and social welfare expenditures. The MOL program would end before its first launch.

Starting in 1966, however, a "massive expansion" of the MOL program began. For instance, the Air Force acquired a 15,000 acre ranch adjacent to Vandenberg deemed necessary to ensure the safety and security of the burgeoning MOL facilities. The AFSC's Space System Division's Deputy Commander for

¹⁹² Launius, *NASA: A History of the U.S. Civil Space Program*, supra, 98-99.

¹⁹³ Compton and Benson, *Living and Working in Space*, Appendix A, 374.

¹⁹⁴ Launius, *A History of the U.S. Civil Space Program*, 99.

¹⁹⁵ Hansen, *Spaceflight Revolution*, 270.

¹⁹⁶ "For \$1.5 Billion: A New Air Force Eye in the Sky," *Newsweek* (September 6, 1965): 47.

Manned Systems Brigadier General Joseph S. Bleymaier predicted that within five years Vandenberg would have continuous manned operations involving forty or more launches annually.¹⁹⁷ However, there were signs that perhaps the OSD would not permit development of the MOL and its facilities as quickly as the Air Force desired. For instance, McNamara permitted no increase in the MOL's FY67 budget above the \$150 million it had been allowed in FY66.¹⁹⁸ *Missiles and Rockets* said this amount was "far below what early DOD estimates had called for in FY '67. . . . it is widely held by Pentagon observers that program stretchout is indeed taking place" despite denials.¹⁹⁹ McNamara's only comment was, "Manned Orbiting Laboratory development should proceed on a deliberate and orderly schedule."²⁰⁰

Some within the defense community, albeit at a low level, even questioned if MOL's mission as a reconnaissance platform merited the projected level of expenditures. An adviser to AFSC Commander General Schriever forwarded a fifty-page paper on MOL. Duncan Macdonald's basic conclusion was, "There is no valid role for man in the acquisition loop of a high resolution operation. The present combination of high resolution operation and MOL format compromises both reconnaissance and MOL and, therefore, the reconnaissance program should be placed under NRO and USAF should restudy its MOL concepts." Macdonald elaborated,

It is my opinion that the current program is not directed toward exploring a sufficiently broad range of military missions, but instead, is concentrating too narrowly on an evaluation and test of the reconnaissance mission. It should be clear that this selected mission as now constituted, provides, at best, a marginal role for man and certainly not a continuing role. As a consequence, U.S.A.F. may well be denying itself the opportunity to explore and establish timely programs for longer range and continuing roles and missions in space. . . . I urge prompt and frank recognition of the fact that the present program is not a MOL program, that it logically belongs as an (unmanned) NRO program and that the U.S.A.F. should redo its MOL concepts.²⁰¹

¹⁹⁷ NASA, *Astronautics and Aeronautics, 1966: Chronology on Science, Technology, and Policy*, NASA SP-4007 (Washington, DC: USGPO, 1967), 11.

¹⁹⁸ *Ibid.*, 24.

¹⁹⁹ "Missiles Gain, Space Suffers at DOD," *Missiles and Rockets* (January 31, 1966): 15.

²⁰⁰ NASA, *Astronautics and Aeronautics, 1966*, *supra*, 87.

²⁰¹ Duncan E. Macdonald, Report, Comments, Observations and Recommendations re Reconnaissance and Photo Optical Programs for MOL, to Brian O'Brien, Chairman, NAS Advisory Committee to USAF Systems Command, for transmission to General Schriever, May 27, 1966, 168.7171-158, AFHRA, i, 1, 5. This AFHRA call number represents its collection of Schriever's personal papers and demonstrates that the report did, in fact, reach Schriever.

There is no evidence that the OSD or the USAF ever seriously reconsidered refashioning MOL into anything other than a reconnaissance platform. However, the Macdonald report does illustrate the fact that whether it had been intended or not, the MOL was in fact being evaluated in the context of the capabilities and innovations of the NRO's reconnaissance satellites.

At the end of 1966 the only launch indirectly associated with the MOL took place. On November 3, 1966 a Titan IIIC lifted off from Cape Kennedy with a modified Gemini capsule: its heat shield had been reconfigured to include the hatch the MOL astronauts would use to pass between the capsule and the laboratory. The goal was to determine if the heat shield's integrity would remain intact and protect the capsule. The capsule endured a 33 minute suborbital flight and then plunged into the atmosphere at 17,500 mph while generating temperatures approaching 3,000° F before being recovered 5,500 miles downrange. The heat shield's integrity was proven and the boilerplate capsule was undamaged.²⁰² For FY68 the MOL's budget started to rise appreciably from FY67's \$150 million because the MOL began to enter its peak period of facilities construction and its initial phase of hardware procurement. McNamara asked Congress in January 1967 for \$431 million (an amount which Congress later approved) for the MOL for FY68, as part of the DoD's overall \$1.99 billion space program. He admitted, however, that MOL's first manned flight date had slipped to late 1969 from original projections of late 1968.²⁰³

Later that spring, however, the increasing weight of the MOL meant the Air Force had to redesign the Titan IIIM with either a larger central core liquid-fueled engine or with larger solid-fuel strap-on rockets. Either way this further delayed MOL's first manned flight until 1970 at the earliest and increased overall program costs from \$1.5 to \$2.2 billion.²⁰⁴ Nevertheless, the government's official space

²⁰² USAF, AFSC, Space Division, History Office, *Space and Missile Systems Organization: A Chronology, 1954-1970*, 1985, p. 180; and Pealer, "Manned Orbiting Laboratory, Part III," *supra*, 19.

²⁰³ McNamara, Statement before a Joint Session of the Senate Armed Services Committee and the Senate Subcommittee on Department of Defense Appropriations on the FY 1968 Defense Budget, January 23, 1967, folder: Unclassified Statement, box 69, RG 200, Robert McNamara papers, NARA, 129-131. Declassified at author's request.

²⁰⁴ Pealer, "Manned Orbiting Laboratory, Part III," *supra*, 20.

report in January 1968 declared, "Development of all the major components of the MOL system was initiated and progressed on schedule during the past year" to include the first stage of the Titan IIIM, mockup and structural assemblies of the laboratory and experiment modules were completed and procurement of the actual system components begun, construction initiated on the Vandenberg launch complex, and 16 MOL astronauts were in training.²⁰⁵

MOL's budget for FY69 was \$515 million out of DoD's overall \$2.22 billion space budget and MOL's projected FY70 spending was \$578 million.²⁰⁶ The government's report of space activities in January 1969 stated MOL was "approaching a point of peak activity" as: structural test assemblies of major system components were fabricated; subsystem components were being manufactured; demonstration firings of the Titan IIIM's first stage commenced; construction of the MOL's launch complex at Vandenberg neared completion; and the training of astronauts continued.²⁰⁷

However, as costs climbed and its initial operational date slipped, doubted seemed to creep into McNamara's thinking about MOL. At the end of 1967 he wrote Secretary of the Air Force Harold Brown, "I am concerned at the amount by which the cost of MOL (approximately \$2.7 billion) exceeds the original estimate, on the basis of which the President approved the program (\$1.5 billion). Even at \$1.5 billion, some consider the program marginal. Should we not reexamine the role of the man and develop a plan for completing MOL, at least in the first phase, without a man? I believe that such a program could be financed in FY 69 at \$400 million."²⁰⁸ Lew Allen was an Air Force officer with a Ph.D. in physics who later became the service's top-ranking general, its Chief of Staff. He indirectly confirmed

²⁰⁵ Executive Office of the President, *U.S. Aeronautics and Space Activities, 1967*, Report to the Congress from the President of the United States, January 1968, NSA MUS document 334, p. 44.

²⁰⁶ DoD, Space Program Budget for Fiscal Years 1968 through 1970, December 31, 1968, Tab 5-7, Box 13, RG 220, Records of the National Aeronautics and Space Council, pp. 1-2. Declassified at author's request.

²⁰⁷ Executive Office of the President, *US Aeronautics and Space Activities, 1968*, Report to the Congress from the President, January 1969, NSA MUS document 335, pp. 2, 36.

²⁰⁸ McNamara, Memorandum for the Secretary of the Air Force, December 9, 1967, folder: Reading file: October 1967 - February 1968, box 131, RG 200, Robert McNamara papers, NARA, 1-2. Declassified at author's request.

McNamara's interest in exploring the conversion of the MOL into an unmanned platform because he. Allen, was the one responsible for conducting the studies of this concept. Allen recalled.

I was assigned the task of developing the technologies to operate the Manned Orbiting Laboratory unmanned, which was a very strange contradiction in terms and really a fascinating perversion of the whole intent. By this time, one had gone full circle: that is, one had decided to have a Manned Orbiting Laboratory without knowing the purpose of it. One had then decided that since you are going to have a Manned Orbiting Laboratory, the only thing to do in it was a particular sensor approach [reconnaissance] which was otherwise going to be done unmanned. Then having decided to do that manned and doing all of the designs for it to be manned, then one came back and said, 'Well, could you automate the things you had already decided for the man to do?' We went through the technology studies of that and concluded that you could do the functions which had now been attributed to the man unmanned. . . . I think the advisory committees ended up perverting the whole process so much that cancellation was inevitable.²⁰⁹

The unstated but nevertheless intense competition between the MOL and the NRO's reconnaissance satellites was therefore clearly present as McNamara departed the DoD; he left his position as Secretary of Defense in April 1968 to become President of the World Bank.

Air Force Magazine in March 1968 reported in a general sense on the growing capabilities of American reconnaissance satellites. It explained that real time reconnaissance (that which transmits images directly to ground stations without the delay caused by the recovery and development of film dropped from orbit) was now possible due to multispectral sensors, microelectronics and the resulting massive but lightweight computer processing capacity, and high volume communications enabled by efficient optical lasers. Thus, "There are strong reasons for believing that orbital cameras now have sufficient resolution to show objects the size of garbage-can tops. Progress in improving resolution has been steady and most of the experts believe it will continue." In addition, the next generation of cameras and film ". . . should be able to photograph objects less than one foot in diameter from an altitude of 150 miles." Up to nine cameras could be put on a single unmanned reconnaissance satellite, each with film sensitive to a separate wavelength region of the light spectrum. Similar technological progress in creating images through radar was also reported.²¹⁰ As Seamans related, "As time went on, after McNamara left, the in-

²⁰⁹ Series of oral history interviews of General Lew Allen, Jr., dated September 30, 1985 - January 10, 1986, K239.0512-1694, AFHRA, 32-33. After retiring from the Air Force Allen was named Director of NASA's Jet Propulsion Laboratory.

²¹⁰ J.S. Butz, Jr., "New Vistas in Reconnaissance from Space," *Air Force Magazine* (March 1968): 46-56.

terest in the project [MOL] became less, and partly because of dollars, but partly because other technologies had moved ahead more rapidly than expected” in robotic reconnaissance techniques and systems.²¹¹

Given these detailed observations resulting from the NRO’s robotic reconnaissance satellites and McNamara’s instructions to study the redesign of the MOL into an unmanned configuration, it seems likely that he was beginning to wonder at the end of his tenure if perhaps any additional capabilities the MOL could offer merited total program expenditures of over two billion dollars. That was indisputably the case upon the advent of the Nixon administration. Nixon’s first order to heads of all executive branch departments and agencies revealed the stringent financial environment he established: “As we set the course of the new administration, a careful and thorough review of the budget must be the first order of business. The American people have a right to expect that their tax dollars will be properly and prudently used. They also have a right to expect that fiscal policy will help to restrain the present excessive rate of price inflation in our economy.” Therefore, each agency would review the outgoing administration’s budget to “identify activities of low priority which can be reduced or phased down and perhaps, over time, eliminated completely.”²¹²

The submissions received from executive branch agencies did not please the new president. He wrote his BoB Director Robert P. Mayo, “I expected that review to result in a sizable reduction in the total Federal spending budgeted by the outgoing administration for the fiscal year 1970.” However, “The report you have given me based on the responses of the department and agency heads is very disappointing. . . . several billions of dollars more must be saved. The inflationary environment in which we find ourselves, our continuing commitment in Southeast Asia” and other factors “all demand decisive and substantial action to reduce the size of the budget and to keep Federal spending under strict control.” He ordered Mayo to develop and recommend a revised 1970 budget “which will be significantly below the \$195.3

²¹¹ Oral history interview of Robert C. Seamans, December 15, 1988, NASM. 395.

²¹² Richard M. Nixon, Memorandum for Heads of Executive Departments and Agencies, January 25, 1969, folder: NASA-DoD Agreements, box 10, RG 220, Records of the National Aeronautics and Space Council, NARA. 1.

billion forecast in the Johnson budget. In some cases our Administration will have to propose and fight strongly for legislation and appropriation reductions that will be unpopular in many quarters.”²¹³

Apparently new Secretary of Defense Melvin Laird was able to preserve MOL through the initial \$1 billion cut from the DoD's \$79 billion dollar budget by reducing total MOL launches from seven to six,²¹⁴ which meant manned launches decreased from five to four. In April 1969 the trade press reported that in addition to reducing MOL's scheduled launches by one, MOL's FY70 budget had been cut by \$51 million from Johnson's original request and now stood at \$525 million.²¹⁵ Robert C. Seamans had moved from Deputy Administrator at NASA under Johnson to Secretary of the Air Force under Nixon. He recalled that as the idea for canceling MOL outright gained momentum during the early Nixon administration, he fought hard to preserve the system. At first when Seamans asked Laird and Deputy Secretary of Defense David Packard if the MOL was to be terminated, they replied, “Well, not really. There's just a little discussion going on.” But he kept hearing such rumors so he finally went to Laird and said he'd like to “. . . have a day in court with the President before the cancellation takes place so that maybe I can convince him not to cancel it.” He was in fact granted 30-45 minutes with Nixon, but the MOL was still canceled: “It really came down to the fact when you're putting in substantial sums for F-15's [the Air Force's next generation fighter] and B-1's [the Air Force's next generation bomber] and satellite warning systems and so forth, its pretty hard to justify more speculative and large developments. NASA had its role, and that's what it's supposed to be doing.”²¹⁶ New Assistant Secretary of the Air Force for R&D Grant L. Hansen stated,

Our aircraft fleet has gotten so behind the times that we have to have a great concentration of effort in that area to be able to get a modern fighter and bomber and airborne early warning system and combat air support aircraft. One of the things we are sacrificing in order to be able to afford to do those things . . . is the further exploitation of capabilities

²¹³ Nixon, Memorandum for Robert P. Mayo, Director of the BoB, March 24, 1969, folder: NASA-DoD Agreements, box 10, RG 220, Records of the National Aeronautics and Space Council, NARA, 1-2. Emphasis in original.

²¹⁴ “Laird Cuts \$1.1 Billion: Battle Goes On,” *Philadelphia Bulletin*, May 9, 1969, p. 8.

²¹⁵ “MOL Delayed by Funding Cut,” *Aviation Week and Space Technology* (April 21, 1969): 17.

²¹⁶ Oral history interviews of Seamans, September 1973 through March 1974, K239.0512-687A, AFHRA, 521-22. Emphasis in oral history transcript. Declassified at author's request.

in space for the things in the future.²¹⁷

To this dissertation's author Seamans elaborated that it was Mayo's Assistant Budget Director James Schlesinger (who later became Secretary of Defense) who approached Seamans "right out of the blue" and said "You guys don't need that MOL, why don't we take that out of your budget? It's just an enigma. It's from the past. Why don't we clean things up and get rid of it?" At this point Seamans approached Laird and asked for the appointment with Nixon. It was scheduled and also in attendance along with Mayo, Laird, Seamans, and an Air Force general was national security adviser Henry Kissinger. Seamans recalled he made the case that higher and higher resolution was important to the DOD and that the MOL would provide it. He described to Nixon how MOL would offer real time intelligence and what a man in the loop could contribute to this process. His briefing took approximately half an hour and Seamans said the president was "obviously interested" and took a lot of notes as Seamans talked. Kissinger later told Seamans it was a good presentation.²¹⁸ Nevertheless, within a week, on June 10, 1969, Deputy Secretary of Defense David Packard announced MOL's cancellation.

Seamans' overall conclusion was that while the financial issue did play a part in the program's demise, the real crux of the matter was that the NRO had "... reason to believe they were going to be able to send back, from satellites, really clear, real-time photographs. They were able to use the very cameras Eastman-Kodak was developing for the MOL" and simply place them on the NRO's unmanned robotic satellites. Therefore, "With that capability coming along, I have to say, looking at it in 20/20 hindsight, the decision was correct. Technology had superseded it. [MOL]"²¹⁹ Schriever's evaluation of the MOL's demise was, "I know that the NRO people were shooting at the MOL, saying we can do it without the man in the loop. So that had something to do with it. But I think the primary reason was the budget. And I think it's really marginal in terms of what the man in the loop would have provided to intelligence."²²⁰

²¹⁷ Cited in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, volume II* (Maxwell AFB, AL: Air University Press, 1989), 683.

²¹⁸ Oral history interview of Seamans, July 5, 1996, by the author.

²¹⁹ Ibid.

²²⁰ Oral history interview of Schriever, July 2, 1996, by the author.

By the time of its cancellation MOL's weight had grown from 25,000 to 30,000 pounds, necessitating continued redesign of the Titan IIIM. Its first manned launch date had slipped to at least early 1971 and its final program cost estimates were \$3 billion.²²¹ Packard's official announcement on June 10, 1969 said MOL was being canceled "because of the continuing need to reduce Federal defense spending and the advances made in automated techniques for unmanned satellite systems."²²² The DoD press release stated that since both houses of Congress "are searching for ways of reducing expenditures. . . . the MOL cancellation will be a major step in reducing the budget." The DoD estimated MOL's cancellation would ultimately save \$1.5 billion. The press release stated it ". . . was necessary to cut back drastically on numerous small programs or to terminate one of the larger, most costly R&D undertakings. We have concluded that the potential value of possible future applications of the MOL were not as valuable as the aggregate of other DOD programs that would need to be curtailed to achieve equal reductions." The DoD stated MOL was unlikely to be ready before mid-1972 and it was these delays that ". . . were largely responsible for the increase in estimated total cost from approximately two to three billion dollars, of which about \$1.3 billion has been spent to date."²²³ As Jeffrey Richelson explained, "Military programs not related to the [Vietnam] war effort were reduced or simply canceled to provide more money for the war. The MOL, the largest non-war item in the Air Force research and development budget, made an inviting target. . . . Vietnam proved to be a budgetary black hole, absorbing funds without anything coming back."²²⁴

An Air Force document also emphasized the two primary reasons of cost reduction and the capability of unmanned satellites to do MOL's job as the main factors in MOL's cancellation: "First, it was determined that most essential DOD space missions could be accomplished with lower cost unmanned

²²¹ Philip J. Klass, *Secret Sentries in Space* (New York: Random House, 1971), 169.

²²² Cited in USAF, AFSC, Space Division, History Office, *Space and Missile Systems Organization: A Chronology, 1954-1970*, supra, 198.

²²³ DoD, News Release No. 491-69, June 10, 1969, folder: USAF MOL, 1968-, DoD subseries, Federal Agencies series, NHDRC, 1-2.

²²⁴ Richelson, *Secret Eyes*, 101-02.

spacecraft. Second, the potential worth of possible future applications of the experimental equipment being developed for MOL, plus the information expected from flights on man's utility in space for military purposes, while worthwhile, did not equate in immediate value to other DOD programs."²²⁵ As the *New York Times* made clear, "Not mentioned by the Pentagon were the rapid strides that have been made in using satellites for detailed photographic reconnaissance."²²⁶ Another secondary source later explained that by the time of the MOL's termination, "The design of a fourth generation of unmanned reconnaissance satellite was far enough along to indicate that it probably could perform most of the functions planned for MOL and do so at lower total cost. While human judgment was extremely useful in space reconnaissance, the cost in terms of spacecraft payload to maintain human astronauts in the hostile environment of space resulted in a questionable trade-off."²²⁷ In other words, while the MOL did offer reconnaissance capabilities beyond what the KH-9/Big Bird could, policy makers decided the price was too high. Even the trade press admitted that the MOL had been "so stretched out by funding cuts and low keyed management that its technology has become obsolete and its costs astronomical."²²⁸

The third factor, beyond cost control and redundancy with reconnaissance satellites, which the present author has stated had some relevance in the MOL's cancellation, was the idea of perceived redundancy with NASA programs, in particular the AAP. This did not seem to be a significant factor within the calculations of the Nixon administration, but one can point to it as a reason explaining why there was little protest from Congress after MOL's cancellation. Perhaps enough members were persuaded that the two stated reasons for MOL's cancellation, when combined with the idea many congressmen had that MOL was duplicative with AAP, created a strong enough case so that most representatives and senators accepted MOL's demise with few second thoughts.

²²⁵ John J. Shaughnessy, Colonel, Chief, Plans Group, Legislative Liaison, USAF, Statement re MOL Cancellation, reprinted in *Congressional Record*, June 10, 1969, p. H4614.

²²⁶ John W. Finney, "Pentagon Drops Air Force Plans for Orbiting Lab," *New York Times*, June 11, 1969, p. 10.

²²⁷ Klass, *Secret Sentries*, 169.

²²⁸ Robert Hotz, "No Tears for MOL," *Aviation Week and Space Technology* (June 30, 1969): 11.

It is unlikely that many within NASA mourned MOL's demise. One who did was Michael Yarymovych, on loan from NASA to the Air Force to serve as MOL Technical Director. He recalled, "When MOL was canceled there was cheering in the aisles of the AAP people. I was not cheering."²²⁹ Whatever were the particulars within Congress and NASA, the fact remained that "The cancellation ended the Air Force's hopes for manned spaceflight and brought to a close a decade of political competition."²³⁰ The MOL's death "... served as another painful lesson to the Air Force and the military that their preferred military space doctrines and programs would not come to fruition."²³¹ The MOL's passing "... signaled the death knell of Air Force efforts to make manned military spaceflight the center of a space-oriented service. . . . the utility of military man-in-space activities would continue to be untested."²³²

By the summer of 1969 a number of events had played themselves out and form a logical stopping point for this dissertation. Americans had reached the moon and returned safely. The USAF's Manned Orbiting Laboratory was terminated and with it the last attempt the Air Force would make for its own, independent human spaceflight program. The AAP's final configuration had finally been decided upon; it would be a "dry" workshop with an ATM launched on a Saturn V and three subsequent crews of three astronauts would visit it, launched on Saturn IBs. As discussed in previous chapters, détente's momentum seemed to be growing and the SALT process would soon commence. Therefore, there seemed little hope for extending the idea of competing in space for prestige any further.

Two main space policy tasks remained. First, the remainder of the Apollo lunar landings took place. Second, Nixon had to decide what his administration's space policy would be. However, it would not be until January 1972 that Nixon decided on the main thrust of America's next generation space en-

²²⁹ Oral history interview of Michael Yarymovych, February 2, 1976, Michael Yarymovych file, Biographical series, NHDRC, 13.

²³⁰ Compton and Benson, *Living and Working in Space*, 109.

²³¹ Peter L. Hayes, *Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War* (Ph.D. dissertation, Fletcher School of Law and Diplomacy, Tufts University, 1994), 232.

²³² Spires, "The Air Force in the Era of Apollo," *supra*, 50.

deavors: the space shuttle. A distinct and fascinating NASA-DoD relationship during the shuttle era in turn developed. A full account of the remaining Apollo flights can and has been written.²³³ The history of the NASA-DoD relationship from 1970 on has not been written and stands as one of the primary research tasks remaining to be accomplished in the political and organizational history of the space age.

²³³ W. David Compton. *Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions*, NASA SP-4214 (Washington, DC: USGPO, 1989).

11. Summary and Conclusion

In terms of its political underpinnings, it is more appropriate to place the Apollo decision in the 1950's than in the 1960's. Apollo was one of the last major acts of the Cold War; the moon project was chosen as a symbol of the head-to-head global competition with the Soviet Union.¹

He [Seamans] mentioned that, in the 1960's, NASA was fully supported because of the competition with Soviet Russia. This type of support should not be expected in the 1970's. NASA should therefore help solve the problems of the natural environment and thereby help pay for itself.²

Apollo was a crash program designed to address a unique set of historical circumstances. Five administrations and seven congresses have made it clear that the country is not likely to engage in such an undertaking any time soon, surely not on a regular basis.³

Several presidents have treated the space program as a demonstration of American leadership: certainly John Kennedy, probably Lyndon Johnson. . . . Even Dwight Eisenhower and Richard Nixon sought to garner foreign policy advantages through the space effort in their own modest ways. . . . None of the presidents - except perhaps Kennedy - has thought it necessary for the United States to be preeminent in space, despite much rhetoric to the contrary.⁴

The last time we flew to the moon, NASA had to pay the bill to put it on national television for the landing, because the networks wouldn't cover it.⁵

¹ John M. Logsdon, "The Apollo Decision in Historical Perspective," in Richard P. Hallion, editor, *Apollo: Ten Years Since Tranquillity Base* (Washington, DC: Smithsonian Institution Press, 1979), 5.

² George M. Low, Deputy Administrator, NASA, Memorandum for Record, Space Shuttle Discussions with Secretary [of the Air Force] Seamans, January 28, 1970, in John M. Logsdon with Dwayne A. Day and Roger D. Launius, eds., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407 (Washington, DC: USGPO, 1996), 367.

³ Alex Roland, "Barnstorming in Space," in Radford Byerly, Jr., editor, *Space Policy Reconsidered* (Boulder, CO: Westview Press, 1989), 47.

⁴ John M. Logsdon, "National Leadership and Presidential Power," chapter 7 in the forthcoming Roger D. Launius, editor, *The Myth of Presidential Leadership* (Urbana, IL: University of Illinois Press), 372 in manuscript copy provided to author.

⁵ Oral history interview of Robert Gilruth, May 2, 1987, NASM, 326.

Most estimates of Project Apollo's final cost cite a figure of approximately \$25 billion dollars. To this one may add \$2.6 billion for Skylab and \$250 million for the Apollo-Soyuz Test Project (ASTP).⁶ The ASTP was the final use of the Apollo-Saturn hardware. As the first international spaceflight it took place when détente was in full bloom in July 1975. Roger Launius explained ASTP's purpose was to test if American and Soviet spacecraft could successfully rendezvous and dock in space and also "to open the way for international space rescue as well as future joint manned flights." The actual flight between July 15 and July 24 involved the docking of the two spacecraft and then two days of experiments. It clearly demonstrated the fading of the competitive dynamic in space policy. As Launius summarized, "The flight was more a symbol of the lessening of tensions between the two superpowers than a significant scientific endeavor; taking 180 degrees the competition for international prestige that had fueled much of the space activities of both nations since the late 1950s."⁷ By the summer of 1975, only six years after the first lunar landing, the Apollo era had drawn to a close.

In 1960 the percentage of the federal budget devoted to the civilian space program was 0.5 percent. After Kennedy's lunar landing decision and by 1965 this had risen nine-fold to 4.5 percent. However, by 1970 the figure had decreased to 2 percent and by 1985 had fallen back to 0.6 percent, almost where it was a quarter of a century earlier.⁸ It appears highly unlikely that America will ever devote to the civilian exploration of space a figure comparable to that of the mid-1960s because with the dissolution of the Soviet Union space exploration will almost certainly never be regarded as a vital geopolitical instrument. Without the status conferred upon it as an integral component of national strategy, space explora-

⁶ Linda Neumann Ezell, *NASA Historical Data Book Volume II: Programs and Projects 1958-1968*, NASA SP-4012 (Washington, DC: USGPO, 1988), 121.

⁷ Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, FL: Krieger Publishing Company, 1994), 100. For the full story of the ASTP see Edward Clinton Ezell and Linda Neuman Ezell, *The Partnership: A History of the Apollo-Soyuz Test Project*, NASA SP-4209 (Washington, DC: USGPO, 1978).

⁸ Sylvia Doughty Fries, "Introduction," to Martin J. Collins and Sylvia D. Fries, editors, *A Spacefaring Nation: Perspectives on American Space History* (Washington, DC: Smithsonian Institution Press, 1991), endnote 1, p. 7.

tion is highly unlikely to receive an increased proportion of a shrinking federal pie. Individuals who forlornly lament the fact that America no longer has a civilian space exploration program commensurate to that of the Apollo heyday seem either unable or unwilling to accept the fact that Apollo received such a high level support only because Kennedy and Johnson saw it as vital to America's waging of the Cold War. Once that factor faded with détente, civilian space expenditures eventually settled back to a level roughly equivalent to where Eisenhower had pegged them decades earlier. As one history of NASA correctly summarized, "In a way, the Soviet Union is responsible for creating NASA. It may well require a military turn in space to force action on the U.S. Congress for a full-speed-ahead program once again, but that is not likely as things stand."⁹

When Tsiolkovsky, Goddard and Oberth speculated as to why humans should penetrate the realm of space, most of their thoughts focused on the potential scientific and possibly commercial benefits. Oberth even foresaw military applications. None of the three, however, postulated that nations would compete for spectacular accomplishments in space as part of a geopolitical struggle. Nevertheless, in the post-WWII environment the quest for prestige and the search for intelligence information on potential adversaries became two of the primary motive factors in humankind's struggle to escape gravity.

As early as 1946 Air Force contractors pointed out the potential utility of satellites for spaceborne reconnaissance. The practical application of this technology, however, depended upon much greater advancement in the art of ballistic missile design and construction so that the satellites would have a launcher to put them into orbit. It was not until Eisenhower vastly accelerated America's drive for an operational ballistic missile that the likelihood of satellite reconnaissance passed from the theoretical into the probable. Both the Technological Capabilities Panel's report and America's first official space policy document, NSC 5520, highlighted the importance of establishing a legal right for reconnaissance satellites in American space policy. This principle was one of the consistent themes of American space policy in the 1950s and 1960s.

⁹ Richard Hirsch and Joseph Trento, *The National Aeronautics and Space Administration* (New York: Praeger Publishers, 1973), 217.

Less constancy was found in presidential conceptions of using space and particularly human spaceflight for augmenting international prestige. After the almost Pearl Harbor-like impact of Sputnik in October 1957, one might have expected Eisenhower to accede to the pervasive demands for a crash America space program that would accomplish something, almost anything, before the Soviets. But Eisenhower's deeply held beliefs about the danger of excessive government spending, and his conception of the cold war as a long-term struggle meant that he followed a more measured course. His creation of NASA ensured America would pursue a significant program of civilian space exploration, although one designed to guarantee America was simply a leader in space, not the leader. His creation of an overarching OSD space hierarchy of ARPA and the DDR&E ensured the USAF's calls for R&D into virtually every facet of using space for the purposes of national defense would be tempered.

Eisenhower's approach to human spaceflight started to become clear in August 1958 when he assigned the mission to NASA instead of the services. He, and his coterie of civilian scientific advisers, concluded that human spaceflight most likely held little potential relevance to America's deterrent strength. The search for a legal regime in which to operate reconnaissance satellites was probably the most important factor in America's space policy under Eisenhower. Thus human spaceflight R&D in the form of Project Mercury would proceed at a deliberate and measured pace and would not be conceived of as a component of any type of a race for prestige. Eisenhower did nod to the importance of space in the quest for prestige, as evidenced by his strong support of the Saturn booster designed to lift heavy payloads into orbit. Still, both Mercury and the Air Force's sole hope in the human spaceflight arena, Dynasoar, were funded at relatively low levels throughout the Eisenhower administration.

Another historical trend emerged during the Eisenhower administration: the basic support-coordination-rivalry structure of the NASA-DoD relationship. During its first few years NASA was heavily dependent on the DoD, and particularly the Air Force, for launch vehicles, top-level managers, national ranges and tracking stations, and expertise in the initiation and administration of large aerospace systems. While NASA would slowly but surely forge its own capabilities in these and other areas and lessen its dependence on the DoD, the complexities of NASA-DoD interaction continued to involve supporting each other (but mostly DoD supporting NASA), coordinating numerous programs so as to avoid

waste and duplication, and occasionally resolving the conflicts and tension that inevitably arose when two large bureaucracies had to operate programs in the same basic area: space exploration.

The avoidance of space for prestige characteristic of Eisenhower's terms was the one fundamental American space policy principle that changed radically under Kennedy. Like Eisenhower, he believed in the ultimate cold war goal of containing the Soviet Union while pursuing arms control and measures designed to lessen tension. Unlike Eisenhower, he believed one of the means the United States should employ to achieve the end of cold war 'victory' was a space race. Accordingly, in May 1961 he set America on its way to the moon when he officially authorized Project Apollo and began the process of quintupling NASA's budget. While Kennedy did order extensive reviews of the space program and his lunar landing goal in 1962 and 1963, the available evidence suggests that his commitment to the goal of landing on the moon before the end of the 1960s held firm until his death in November 1963.

The NASA-DoD relationship in the Kennedy era also saw a flurry of activity. At first many accused the Air Force of waging a 'campaign' to take over NASA. While it is possible that some Air Force officials not at the top policy-making levels harbored such desires, the relationship between Chief of Staff White and NASA Administrator Glennan was cordial and their correspondence revealed determined efforts aimed at allaying congressional fears of Air Force hegemony. Kennedy's establishment of the lunar landing goal soon rendered the point moot as NASA's budget skyrocketed and its congressional patrons were strengthened as well in their support of NASA's interests. An additional factor that quickly reined in any nascent Air Force desires for a larger role in the United States space program was Secretary of Defense McNamara and his new OSD managerial philosophy. Under systems analysis and PPBS not only did the Air Force have to offer convincing and quantifiable proof that a space project added to America's national security, the USAF also had to make clear that its space efforts did not in any way conflict with NASA's R&D; if they did, the USAF was extremely unlikely to win approval for a space proposal.

It appeared that shortly after they began their service in the Kennedy administration, Webb and McNamara had a sort of falling out and were unable to deal with each other on a face-to-face basis; further communication took place through subordinates such as Robert Seamans and John Rubel. Simultaneously, McNamara became convinced that the capabilities Dynasoar was designed to offer could largely

be provided more cheaply and more quickly by NASA's Gemini. Therefore, McNamara made a bid in late 1962 for managerial control over Gemini. While his attempt failed, it did lead to a January 1963 NASA-DoD Gemini agreement that increased DoD's role in Gemini and permitted the DoD to place experiments aboard NASA's Gemini flights. Quite possibly, Dynasoar's days were numbered from this point. Meanwhile, the multifaceted DoD support for NASA continued, to include Brigadier General Samuel Phillips as Apollo Program Director. At times, however, this very support could lead to tension and rivalry, as illustrated by NASA-DoD differences over the questions of reimbursement and personnel transfers that emerged late in the Kennedy administration and increased throughout Johnson's.

Over the course of 1963 McNamara became convinced that the DoD did not require Dynasoar. While he cited the fact that the Air Force had not provided him with specific military missions for the glider to perform, the reality was that McNamara had prohibited the Air Force from investigating that very topic when he reoriented the Dynasoar into a strictly research vehicle called the X-20 and deemed it an orbital system designed to explore maneuverable reentry, not a suborbital vehicle searching for information on hypersonic flight. This McNamara-decreed reorientation also resulted in NASA's distancing itself from the project. By December 1963 it fell to new President Johnson to approve McNamara's recommendation that Dynasoar be canceled and replaced by a experimental space laboratory, the MOL. The final significant development of 1963 was the fact that the Soviet Union implicitly and quietly accepted the reality and legality of satellite reconnaissance, thereby fulfilling one of the primary American space policy goals since 1955. As a result, the NRO and the American reconnaissance satellite program went even deeper into the "black" in an attempt to stabilize a situation in which satellite reconnaissance was no longer a diplomatic football but rather a tacitly recognized international fact.

Under President Johnson there was a great deal of continuity in both the approach to using space as a competitive cold war tool and in the NASA-DoD relationship. While it was true that NASA's budget first leveled off and then began its long term decline under Johnson, Johnson always ensured that Project Apollo had enough budgetary and political protection to stay on course and on schedule. DoD's support of NASA continued and so did the two agencies' close coordination of plans and projects through such entities as the AACB. Tension and rivalry between the two was largely confined to the questions of how

much NASA would reimburse the DoD for services rendered and how many military officers the DoD would be expected to provide NASA. Neither of these areas of disagreement, however, altered the fact that over the course of the mid- to late 1960s NASA's institutional capabilities in all areas from managerial personnel to launch facilities continued to mature and resulted in a lessened degree of dependence upon the DoD.

The programmatic aspect of the NASA-DoD relationship under Johnson had as its most important feature the approval and then, shortly after he left office, the cancellation of the MOL. Even before McNamara left the DoD and Nixon became President, McNamara ordered the Air Force to explore the idea of reconfiguring the MOL into an unmanned system. As the MOL's budget continued to climb and its initial operation date regularly slipped, it was thrown into competition with NRO robotic satellites which were more and more capable such as the fourth generation KH-9 that eventually debuted in mid-1971. Within six months of Nixon's inauguration and subsequent imposition of government-wide financial constraints, MOL was terminated. It was a victim not only of budget cuts and indirect competition with NRO's satellites but also a more obvious form of competition with NASA's plan to use Apollo-Saturn hardware for earth orbital R&D. While both NASA and DoD regularly claimed NASA and the AAP were not duplicative, enough suspicion that they in fact were lingered in Congress to prevent any significant protest over the MOL's demise.

Arnold S. Levine is the only scholar who has previously examined in detail the NASA-DoD relationship. He correctly explained that the DoD was "... the one Federal agency with which NASA had to come to terms in order to carry out its mission at all. The essence of their relationship had far more to do with mutual need than with philosophical arguments concerning the existence or the desirability of one space program or two."¹⁰ It is difficult to dispute this interpretation of the pragmatic nature of the NASA-DoD relationship. NASA needed certain items such as launch vehicles and particular services such as managerial expertise from the DoD. NASA's requests were honored and NASA carried out its general

¹⁰ Levine, *Managing NASA in the Apollo Era*, 211.

mission of civilian space exploration and its particular tasking of landing an American on the moon before the end of the 1960s. Levine then elaborated that within this relatively straightforward supportive relationship (which in turn gave rise to intricate coordination mechanisms so as to minimize duplication between the two multibillion dollar programs). "Where the two agencies could not agree was in the sphere where program philosophy and program management overlapped, particularly in the cases of Gemini and Manned Orbiting Laboratory."¹¹

McNamara's failed attempt to seize managerial control of Gemini did lead to a January 1963 NASA-DoD Gemini agreement that increased the DoD's level of participation in the program. This increased DoD involvement soon led in December 1963 to the OSD's conclusion that Dynasoar should be canceled and MOL initiated. In addition, by the end of the Kennedy administration, "NASA succeeded in freeing itself from over DOD control by 1963."¹² The MOL matured as a reconnaissance gathering platform over the course of the next five years but it too expired as a new president concluded that the nation's finances could not support it and that its purported capabilities were, by 1969, largely superseded by the NRO's reconnaissance satellites.

Therefore, while it is not entirely accurate to declare, "It remains imperative to have NASA keep its status as the decorous front parlor of the space age in order to reap public support for all space projects and give Defense Department space efforts an effective 'cover,'"¹³ there was nevertheless some small element of truth in that scholarly team's assessment. This central truth was that NASA did in a sense present a convenient focus for the publicity concerning America's highly visible civilian space exploration program while at the same time America's military uses of space, in particular the commencement and perfection of satellite reconnaissance, proceeded under a deepening cloak of secrecy. By the fall of 1963 the Soviets accepted the centrality of spaceborne reconnaissance to a stable and mutual deterrence and ceased their diplomatic campaign to outlaw it. American space policy thus continued to highlight NASA

¹¹ Ibid., 229.

¹² Ibid., 236.

¹³ Erlend A. Kennan and Edmund H. Harvey, *Mission to the Moon: A Critical Examination of NASA and the Space Program* (New York: William Morrow & Company, 1969), 217.

and its activities not only because it was busy racing the USSR to the moon in a presidentially-mandated quest for prestige, but because spotlighting NASA diverted attention away from the military uses of space and thus was unlikely to upset the delicate diplomatic consensus that tacitly sanctioned reconnaissance satellites. Walter McDougall correctly summarized, "The principal concern of American [space] policy was always the protection of spy satellites." The resulting American space strategy encompassed a dual thrust that featured the "... establishment of a legal regime in space that complemented the American propaganda line of openness and cooperation in space and held out hope of agreements to 'put a lid on the arms race,' and at the same time preserved American freedom to pursue such military missions in space as were needed to protect and perfect the nuclear deterrent."¹⁴

NASA's current historian explained that WWII made possible the exploration of space because it forced nations to focus on technical progress in rocketry, though obviously for purposes of weapons development. Then as the cold war intensified after WWII, space technology was pursued largely for its military potential and its prestige-related aspects: "The security role of the Department of Defense and the function of NASA as a civilian space agency have been inextricably related ever since."¹⁵ Another space historian explained that from the earliest days of Tsiolkovsky, Goddard, and Oberth, pioneering thinkers envisioned the increase in scientific knowledge and the possible practical benefits to humankind that could be generated through space exploration. Then after WWII, "Although as policy goals they [scientific exploration of and commercial use of space] remain essentially unaltered, public clamor in the wake of Sputniks 1 and 2 introduced a third goal: ensuring national pride and international prestige. . . . What had begun as an evenly if slowly paced research and development effort would be spurred forward at a gallop."¹⁶ Kennedy's contribution was to focus on human spaceflight as the primary prestige-gathering

¹⁴ McDougall, *Heavens and the Earth*, 178, 187.

¹⁵ Roger D. Launius, "Early U.S. Civil Space Policy, NASA, and the Aspiration of Space Exploration," in Launius, editor, *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, American Astronautical Society History Series, vol. 18 (San Diego, CA: Univelt, Inc., 1996), 64-65.

¹⁶ R. Cargill Hall, "Thirty Years Into the Mission: NASA at the Crossroads," in *Reading Selections: Space Issues Symposium* (Maxwell AFB, AL: Air War College, 1988), 134.

tool and accelerate its pace from a gallop into a full sprint. Johnson maintained the primacy of the lunar landing goal but refused to extend it to any follow-on space projects.

It seems beyond dispute, then, that civilian space exploration was a child of cold war politics: "As it had in the past and would in the future, international politics more than international dreams advanced the development of space technology."¹⁷ Launius correctly summarized that, "The history of space and rocketry during the twenty years after World War II was almost entirely propelled by the rivalry between the United States and the Soviet Union, as the two great superpowers engaged in a 'cold war' over the ideologies and allegiances of the non-aligned nations of the world." This intense United States-USSR competition "ensured that they would dedicate significant resources to the effort" of exploring space and in the end, "It was this rivalry that prompted the development of a formal U.S. civil space program."¹⁸ Again and again space historians have emphasized, "The initial driving force for a strong American space program was not scientific, economic, or romantic, but political - the pursuit of national prestige and power by a new means and in a new frontier. This no doubt accelerated the development of spaceflight capabilities and the attainment of high-visibility goals. . . ." In this sense, "The astronauts were our modern Cold War equivalents of the medieval knights who stepped forward to engage in single-man combat with the enemy."¹⁹ This dissertation's examination of the specific component of the NASA-DoD relationship within the broader fields of space history and policy supports the correctness of the fundamental thesis linking the cold war, prestige, and space exploration.

Did NASA, the lunar landing goal and Project Apollo merit the national priority and approximately \$25 billion accorded them? Any answer to that question must admit, "In the final analysis, it is difficult to think of a way to identify and measure the independent contribution to U.S. international pres-

¹⁷ Nathan C. Goldman, *Space Policy: An Introduction* (Ames, IA: Iowa State University Press, 1992), 7.

¹⁸ Launius, *A History of the U.S. Civil Space Program*, *supra*, 17.

¹⁹ John Noble Wilford, "A Spacefaring People: Keynote Address," in Alex Roland, editor, *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405 (Washington, DC: USGPO, 1985), 70.

tige of being perceived as a leader in space. There is no equation linking prestige with influence, power, and control over events and choices."²⁰ One's answer necessarily reveals more about one's opinions concerning NASA, space exploration, and the wisdom of human spaceflight than it does about any objective evaluation of facts, figures, and geopolitical consequences.²¹ Having said that, it should come as no surprise that opinions occupy all points along the spectrum.

Alex Roland is a pointed critic of human spaceflight in general and Project Apollo in particular. He accuses NASA of being "locked into a climate of opinion bred of Sputnik, Gagarin, and Apollo. It is intent upon extending the romantic era of spaceflight - indeed upon building our whole future in space around a program of barnstorming. We are in a state of suspended adolescence, deferring mature exploitation of space in a childish infatuation with circus." He believes the origins of this "anachronism" are found in the Apollo program. He posits that Apollo established a long term NASA focus on human spaceflight and that the problem with this "... is that it is driven by romance not practicality. There are many worthwhile things to do in space; sending people there is one of the most expensive and least productive. . . . It costs ten times as much to conduct a space mission with people as it does with automated spacecraft." Further, in Roland's opinion, "Any specific mission we can identify to conduct in space we can build a machine to do. And we can do it more quickly, more safely, and at a fraction of the cost of sending people up to do it." Roland did grant that "Apollo returned to the U.S. just what it went after - the international prestige of being the best in space." But he questions if this was worth \$25 billion and even if it was disputes the subsequent centering of most of NASA's space effort around human spacecraft and facilities in space.²²

²⁰ John M. Logsdon, "National Leadership and Presidential Power," chapter 7 in the forthcoming Roger D. Launius, editor, *The Myth of Presidential Leadership* (Urbana, IL: University of Illinois Press), 393 in manuscript copy provided to author.

²¹ The author fully admits to a generalized support of space exploration and NASA's civilian pursuit of it via human spaceflight with the caveat that America's defense-oriented needs in space must first be provided for.

²² Alex Roland, "Barnstorming in Space," in Radford Byerly, Jr., editor, *Space Policy Reconsidered* (Boulder, CO: Westview Press, 1989), 39, 42, 46-47.

In another format Roland declared, "The space race, however, has no payoff beyond prestige. A victory in one heat achieves nothing unless you also win the next one. . . . The prize is in the prestige; the purse is filled with Tang." He likened the cold war space programs to historical antecedents such as the Great Pyramids of Egypt that served as "awe-inspiring monuments to the power of the state and its ability to waste incredible resources on otherwise pointless enterprises. . . . The space program, and manned spaceflight in particular, surely fits this mold: an enormous, expensive, inspiring technological artifact whose cost in labor, lives, and treasure exceeds its practical utility. . . . No national consumption in the last thirty years has been more conspicuous than manned spaceflight."²³ Other analysts who reach negative conclusions concerning America's space program in the 1950s and 1960s express sentiments similar to Roland's, though perhaps not as eloquently expressed.

This dissertation's author, however, finds himself subscribing to another set of conclusions offered by what appears to be a wider range of scholars. At a minimum it seems likely that, "A Soviet first landing on the moon in the 1960s would undoubtedly have been interpreted throughout the world as a humiliation and a grave reverse for the West."²⁴ One need only recall the alarmed reactions to Sputnik in October 1957 and the Gagarin flight in April 1961 to support this conclusion. As Webb's biographer stated, "In the broad sweep of history Apollo was a critical victory in the Cold War technological competition between the United States and the Soviet Union. Certainly, subsequent history between the two nations would have differed greatly had Russians walked the moon, rather than Americans."²⁵ It is possible that the space race acted as a sort of relief valve for the Soviet-American rivalry: "Had we not had the peaceful space rivalry of the 1960s, the Soviet Union and the United States might have been forced into military demonstrations of their technological prowess. . . . Without the space race, there might have been more incidents like the Cuban missile crisis. . . . Apollo relieved some of that pressure. It permitted the

²³ Alex Roland, "The Lonely Race to Mars: The Future of Manned Spaceflight," in Radford Byerly, Jr., editor, *Space Policy Alternatives* (Boulder, CO: Westview Press, 1992), 41-43.

²⁴ Alan J. Levine, *The Missile and Space Race* (Westport, CT: Praeger, 1994), 206.

²⁵ W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore and London: The Johns Hopkins University Press, 1995), 214.

United States to prove that it had the technology to deliver military warheads anywhere it wanted. . . . Ironically, America's civilian space program made credible the military capabilities of the Department of Defense."²⁶

As is the case with many facets of space history and policy, the dean of scholarly studies in this field ably tied together the important trends:

Given the context of 1961, the Apollo *decision* was an appropriate choice of a symbol to serve the national interest at the time: however, given the drastically changed social and political context of the late 1960's and early 1970's, the culmination of the Apollo program was a rather inappropriate manifestation of what was receiving priority in this country. . . . Kennedy cannot be faulted for not anticipating the domestic and international upheavals of the sixties; few people did. . . . Thus it is possible to conclude that starting Apollo was a 'good' decision, while still having a mixed evaluation of itself. . . . The message communicated by Apollo in 1969 and later was not what Kennedy intended when he started the project in 1961.

Logsdon explained that when Kennedy started Apollo he viewed it as a "remedial action" designed to respond to "a variety of political and psychological needs which were present in the nation at the time the decision was made." In the ultimate evaluation,

Apollo *did* serve the short-term objectives of Kennedy rather well. While it is extremely difficult to isolate the influence of deciding to compete with the Soviet Union from the influence of other actions and decisions of the period which led to the end of Cold War hostilities, there may well have been such an influence. If the United States had not opted to compete, the Soviet Union would have continued to reap political benefit from its space successes. By entering the race with such a visible and dramatic commitment, the United States effectively undercut the Soviet monopoly of space spectacles, without doing anything except announcing its intention to compete.

Logsdon added that, "Without having done Apollo first, the decision to commit to the shuttle and to the level of space activity in the 1980s that is implied by that commitment would not have occurred in 1972.

. . . The fact that the United States began, and completed, Apollo created the context within which the focus of the space program could be turned to earth-oriented activities. . . . Without having first accomplished Project Apollo, almost everything else which has been done in space since would have been much more difficult to initiate."²⁷

²⁶ Edward C. Ezell, "The Apollo Program: History Must Judge," in Richard P. Hallion, editor, *Ten Years Since Tranquillity Base* (Washington, DC: Smithsonian Institution Press, 1979), 30.

²⁷ John M. Logsdon, "The Apollo Decision in Historical Perspective," in Richard P. Hallion, editor, *Apollo: Ten Years Since Tranquillity Base* (Washington, DC: Smithsonian Institution Press, 1979), 5-9. Emphasis in original.

Logsdon was not alone in his characterization of Apollo was "an important victory"²⁸ and "a substantial success."²⁹ After all, given the turmoil of the late 1960s, if not for the space program, "there would be little positive for Americans to remember from that time."³⁰ Lambright concurred: "With Vietnam a disaster and Johnson's Great Society falling apart, space remained the one positive legacy from the Kennedy-Johnson years."³¹ Whether hard-core human spaceflight enthusiasts realized it or not, once America reached the moon "... the extraordinary flurry of technological activity to get humans off the planet and on their way to other worlds far, far away was over - at least for the time being, until external circumstances would once again come together to spur the inner disquiet that launches such space odysseys. . . . If Apollo was about leaving, the period after Apollo was about staying home."³²

As of late 1996, such a repeat of the requisite external circumstances has not yet transpired and it appears extremely unlikely that they will in the foreseeable future. Until another president calculates, as did Kennedy and to some degree Johnson, that preeminence in space is an important element of U.S. power, NASA's program of civilian space exploration will likely remain focused on earth orbital activities. The unmanned exploration of Mars could certainly accelerate given recent speculation concerning the possibility of microscopic life there but a human expedition to the Earth's nearest planetary neighbor would seem to be, at a minimum, several decades away. After all, "Space exploration has been intimately tied to the Cold War that followed the hostilities of the world war. As the Cold War ends, so, I assert, does much of the energy and momentum that propelled us to do some wonderful things in space exploration. Without that drive, and with increasing competition for public funds, it is apt to ask whether space

²⁸ John M. Logsdon and Alain Dupas, "Was the Race to the Moon Real?" *Scientific American* (June 1994): 23.

²⁹ John M. Logsdon, "Evaluating Apollo," remarks at a symposium, *Apollo in its Historical Context*, organized by the Space Policy Institute, Center for International Science and Technology Policy, George Washington University, July 19, 1989, p. 3.

³⁰ *Ibid.*, 4.

³¹ Lambright, *Powering Apollo*, *supra*, 189.

³² James R. Hansen, *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo*, NASA SP-4308 (Washington, DC: USGPO, 1995), 428.

exploration can survive the end of the Cold War."³³ One conclusion is firm, however: the multifaceted relationship between NASA and the DoD involving support, coordination, and rivalry formed an important component of America's first decade in space and in its cold war strategy. The NASA-DoD relationship does and will continue to play a vital role in determining the nature, pace, and international posture of America's presence in space.

³³ Bruce Murray, "Can space exploration survive the end of the Cold War?" *Space Policy* (February 1991): 23.

BIBLIOGRAPHY

Primary Sources

Books, Memoirs, Oral History Interviews, Articles by Participants

- Allen, Lew, Jr., General, USAF. Series of oral history interviews of, dated September 30, 1985 - January 10, 1986. K239.0512-1694, Air Force Historical Research Agency (AFHRA).
- Boone, W. Fred. *NASA Office of Defense Affairs: The First Five Years, December 1, 1962, to January 1, 1968*, NASA HHR-32. Washington, DC: USGPO, 1970.
- Boushey, Homer A., Brigadier General, Deputy Chief of Staff for Research and Development, USAF. "Who Controls the Moon Controls the Earth." *US News and World Report* (February 7, 1958): 54.
- Dean, Alan L. "Mounting a National Space Program," in Henry Jarrett, editor, *Science and Resources: Prospects and Implications of Technological Advance*. Baltimore: The Johns Hopkins University Press, 1959.
- Doolittle, James H. Oral history interview of, April 21, 1969. K239.0512-625, AFHRA.
- Draper, C.S. Oral history interview of, June 2, 1974. Folder: Kennedy - Pre-White House, box: White House, Presidents, Kennedy, Kennedy Library materials, interviews through 1960, NHDRC.
- Dryden, Hugh. Oral history interview of, March 26, 1964, folder: Dryden, Mercury Tape, Dryden subseries, Deputy Administrators series, NHDRC.
- _____. Oral history interview of, September 1, 1965. Folder: Dryden, Mercury Tape, Dryden subseries, Deputy Administrators series, NHDRC.
- Eisenhower, Dwight D. *Waging Peace: 1956-1961*. New York: Doubleday & Company, Inc., 1965.
- _____. "Are We Headed in the Wrong Direction?" *Saturday Evening Post* 235 (April 11-18, 1962): 19-25.
- _____. "Spending Into Trouble." *Saturday Evening Post* 236 (May 18-25, 1963): 15-19.
- _____. "Why I Am A Republican." *Saturday Evening Post* 237 (April 11-18, 1964): 17-19.
- Eisenhower, John S.D. Oral history interview of, February 28, 1967. DDEL.
- Enthoven, Alain, and K. Wayne Smith. *How Much is Enough: Shaping the Defense Program*. New York, 1971.
- Ferguson, James. Oral history interview of, May 8-9, 1973. K239.0512-672, AFHRA.
- Gale, Oliver M. "Post-Sputnik Washington from an Inside Office." *Cincinnati Historical Society Bulletin* 31 (1973): 224-52.
- Galloway, Eilene. Oral history interview of, conducted by author, June 2, 1995.
- Gardner, Richard N., Deputy Assistant Secretary of State for International Organization Affairs. "Cooperation in Outer Space." *Foreign Affairs* 41 (January 1963).

Garthoff, Raymond L. "Banning the Bomb in Outer Space." *International Security* 5 (1980/81): 25-40.

Gilpatric, Roswell. Oral history interview of, June 30, 1970. From *The John F. Kennedy Presidential Oral History Collection, Part I: The White House and Executive Departments*, microfilmed from the holdings of the John F. Kennedy Library. Frederick, MD: University Publications of America, 1988, reel 5.

Gilruth, Robert. Oral history interviews of: February 27, 1987; May 2, 1987. NASM.

Glennan, T. Keith, J.D. Hunley. Editor, with an Introduction by Roger D. Launius. *The Birth of NASA: The Diary of T. Keith Glennan*, NASA SP-4105. Washington, DC: USGPO, 1993.

Glennan, T. Keith. "Our Plans for Outer Space." *Saturday Evening Post* 231 (Feb. 28, 1959): 99-102.

_____. Oral History interview of, April 5, 1974. Folder: Glennan Interview 4/5/74, Glennan subseries, Administrators series, NHDRC.

_____. Oral history interview of, May 29, 1987, NASM.

Goodpaster, Andrew J. Oral history interview of, July 22, 1974. Folder: Goodpaster interview, box: White House, Presidents, Eisenhower, DOD/CIA Information, NHDRC.

Harlow, Bryce. Oral history of, Deputy Assistant to the President for Congressional Affairs, June 11, 1974. Folder: Bryce Harlow interview, box: White House, Presidents, Eisenhower (cont.), DOD/CIA Information, Eisenhower, John S.D. - Lodge H.C., NHDRC.

Hechler, Ken. *The Endless Space Frontier: A History of the House Committee on Science and Astronautics, 1959-1978*, America Astronautical Society History Series, Vol. 4. San Diego, CA: Univelt, Inc., 1982.

Hitch, Charles. *Decision Making for Defense*. Berkeley, CA: University of CA Press, 1965.

_____. "Plans, Programs, and Budgets in the DoD." *Operations Research* 11 (January-February 1963): 1-17.

Horner, Richard. Oral history interview of, March 13, 1974. Box: Emme/Roland interviews on early NASA history, shelf V-A-1, NHDRC.

Hunsaker, Jerome C., (NACA Chairman from 1941-56). "Forty Years of Aeronautical Research," in *Forty Fourth Annual Report of the National Advisory Committee for Aeronautics, 1958, Final Report*. Washington: USGPO, 1959.

Johnson, Lyndon B. *The Vantage Point: Perspectives on the Presidency, 1963-1969*. New York: Holt, Rinehart and Winston, 1971.

_____. "The Politics of the Space Age." *Saturday Evening Post* (February 29, 1964): 22-24.

_____. "The Vision of a Greater America." *The General Electric Forum for National Security and Free World Progress* V (July-September, 1962).

_____. Oral history interview of, by Walter Cronkite, July 5, 1969. Folder: LBJ Interviews, box: White House, Presidents, Johnson, Pre-White House - White House Interests, NHDRC.

- Kaufmann, William W. *The McNamara Strategy*. New York: Harper & Row, 1964.
- Kennedy, John F. "If the Soviets Control Space, They Can Control Earth." *Missiles and Rockets* (October 10, 1960): 12-13.
- Khrushchev, Nikita. *Khrushchev Remembers: The Last Testament*. Boston: Little, Brown, 1974.
- Killian, James R., Jr. *The Education of a College President*. Cambridge, MA: The MIT Press, 1985.
- _____. *Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology*. Cambridge, MA: The MIT Press, 1977.
- _____. Oral history interview of, November 9, 1969 through July 16, 1970. DDEL.
- _____. Oral history interview of Killian, July 23, 1974. Biographical series, Killian file, NHDRC.
- Kistiakowsky, George B. *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology*. Cambridge, MA and London: Harvard University Press, 1976.
- _____. Oral history interview of, May 22, 1974. File: Kistiakowsky, box: Emme/Roland interviews on early NASA history, shelf V-A-1, NHDRC.
- LeMay, Curtis. Oral history interview of, January 1965. K239-0512-714, AFHRA.
- McNamara, Robert S. *The Essence of Security: Reflections in Office*. New York: Harper & Row, 1968.
- Medaris, John B., Major General, US Army, Retired. w/Arthur Gordon. *Countdown for Decision*. New York: G.P. Putnam's Sons, 1960.
- Mueller, George. Oral history interview of, November 8, 1988. NASM.
- Newell, Homer E. *Beyond the Atmosphere: Early Years of Space Science*, NASA SP-4211. Washington, DC: USGPO, 1980.
- Oberth, Hermann. *Ways to Spaceflight*, 1972 translation of *Wege zur Raumschiffahrt*, 1929. NASA TT-F-9227, Biographical series, Hermann Oberth file, NASA Historical Data Reference Collection (NHDRC).
- Phillips, Samuel. Oral history interview, July 22, 1970. Phillips file, Biographical series, NHDRC.
- Putt, Donald E., Lieutenant General, USAF. Oral history interview of, April 30, 1974. File: Donald E. Putt, Biographical series, NHDRC.
- Schriever, General Bernard A. Oral history interview of, June 20, 1973. K239.0512-676, AFHRA.
- _____. Oral history interview, June 29, 1977, K239.0512-1492. AFHRA.
- _____. Oral history interview, July 2, 1996, conducted by the author.
- _____. "Comments." in Allan A. Needell, editor, *The First 25 Years in Space*. Washington, DC: Smithsonian Institution Press, 1983.

- _____. "Does the Military Have a Role in Space?" In Lillian Levy, *Space: Its Impact on Man and Society*. New York: W.W. Norton & Company, 1965.
- Seamans, Robert C., Jr. *Aiming at Targets*. Beverly, MA: Memoirs Unlimited, 1994. Publication by NASA of a modified version forthcoming as part of the NASA History Series.
- _____. Oral history interview of, March 27, 1964. Folder: JFK Library Interview, Seamans subseries, Deputy Administrators series, NHDRC.
- _____. Oral history interview of, May 26, 1966. Folder: Gemini interview, Seamans subseries, Deputy Administrators series, NHDRC.
- _____. Oral history interview of, by Logsdon, December 5, 1967. Folder: Seamans/Logsdon interview, Seamans subseries, Deputy Administrators series, NHDRC.
- _____. Series of oral history interviews of: May 8, 1968; June 3, 1968. Folder: Exit Interview, Seamans subseries, Deputy Administrator series, NHDRC.
- _____. Oral history interviews of, September 1973-March 1974. K239.0512-687A, AFHRA, 539. Declassified at author's request.
- _____. Series of oral history interviews of: November 2, 1987; January 19, 1988; December 15, 1988. NASM.
- _____. Oral history interview of, by the author, July 5, 1996.
- Shapley, Willis, Military Division, BoB. Oral history interview of, December 14, 1967, by John Logsdon. File: Willis Shapley, Biographical series, NHDRC.
- Siegel, Gerald. Oral history interview of, June 8, 197. Box: Emme/Roland interviews on early NASA history, shelf V-A-1, NHDRC.
- Sorensen, Theodore C. *Kennedy*. New York: Harper & Row, Publishers, 1965.
- Space Policy Institute, George Washington University. *The Legislative Origins of the Space Act: Proceedings of a Videotaped Workshop*, April 3, 1992.
- Staats, Elmer. Oral history interview of, July 13, 1964. Folder: Kennedy Library, box: White House, Presidents, Kennedy, Photographs - Presidential Library, NHDRC.
- Tsiolkovsky, K.E. *Works on Rocket Technology*, NASA Translation TT F-243, November 1965, from the Publishing House of the Defense Industry, Moscow, 1947. Box: Works on Rocket Technology by K.E. Tsiolkovsky, shelf: III-B-7, NHDRC.
- Twining, Nathan. *Neither Liberty Nor Safety*. New York: Holt, Rinehart and Winston, 1966.
- Webb, James E. Oral history interview of, April 11, 1974. File: James Webb, box: Emme/Roland interviews on early NASA history, shelf: V-A-1, NHDRC.
- _____. Oral history interviews of Webb: March 15, 1985, October 15, 1985. NASM.
- _____. "NASA and the USAF: A Space Age Partnership." *The Airman* (August 1964): 6-11.

Welsh, Dr. Edward C. Oral history interview of, February 20, 1969. Folder: LBJ Speeches. Press Conferences (1968), box: White House. Presidents. Johnson, Chronological, Press Conferences. NHDRC.

Wheelon, Albert D. "Lifting the veil on CORONA." *Space Policy* 11 (November 1995): 249-260.

White, Thomas D. Letter to Overton Brooks, January 19, 1961. IRIS 1002992, AFHSO.

_____. "Space Control and National Security." In the editors of *Air Force Magazine, Space Weapons: A Handbook of Military Astronautics*. New York: Frederick A. Praeger, 1959.

Wiesner, Jerome. Oral history interview of, July 24, 1974. Wiesner file, Biographical series, NHDRC.

Yarymovych, Michael. Oral history interview of, February 2, 1976. Michael Yarymovych file, Biographical series, NHDRC.

York, Herbert. *Race to Oblivion: A Participant's View of the Arms Race*. New York: Simon and Schuster, 1970.

_____. Oral history interview of, June 16, 1964. Folder: Kennedy Library, box: White House. Presidents, Kennedy, Photographs - Presidential Library, NHDRC.

_____. Oral history interview of, June 12, 1973. Herbert York file, Biographical series, NHDRC.

_____. Oral history interview of, January 24, 1989. National Air and Space Museum (NASM).

Zuckert, Eugene. Oral history interview of, July 25, 1964. 168.7050-1, AFHRA.

_____. Oral history interview of, September 1965. K239.0512-763, AFHRA.

_____. Series of oral history interviews of, December 1986. K239.0512-1763, AFHRA.

Published Collections of Documents

Air Force Support of Project Gemini, Inputs from the Major Commands, 1967. K110.8-50, AFHSO.

Air Force Systems Command. *History of the Aeronautical Systems Division, July-December 1963, Volume IV, Termination of the X-20A Dyna-Soar (Documents)*. AFSC Historical Publications Series 64-51-IV. K243.011, AFHRA. Declassified at author's request.

The Berlin Crisis, 1958-1962. National Security Archive microfiche document collection. Alexandria, VA: Chadwyck-Healey, Inc., 1991.

Branyan, Robert L. and Lawrence H. Larsen, editors/compiler. *The Eisenhower Administration, 1953-1961: A Documentary History*, two volumes. New York: Random House, Inc., 1971.

The Diaries of Dwight D. Eisenhower, 1953-1961. Microfilmed from the Holdings of the Dwight D. Eisenhower Library. Robert Lester, Editor. Part of the *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*. William Leuchtenburg, General Editor. Bethesda, MD: University Publications of America, 1986.

Eisenhower, Dwight D. *Public Papers of the President of the United States, 1953*. Washington, DC: USGPO, 1960.

- _____. *Public Papers of the President, 1955*. Washington, DC: USGPO, 1959.
- _____. *Public Papers of the President, 1957*. Washington, DC: USGPO, 1958.
- _____. *Public Papers of the President, 1958*. Washington, DC: USGPO, 1959.
- _____. *Public Papers of the President, 1959*. Washington, DC: USGPO, 1960.
- _____. *Public Papers of the President, 1960-1961*. Washington, DC: USGPO, 1961.
- Glennon, John P., Editor in Chief. *Foreign Relations of the United States, 1955-1957, Volume XI, United Nations and General International Matters*. Washington, DC: USGPO, 1988.
- Goddard, Robert H. *The Papers of Robert H. Goddard*. Esther C. Goddard, Editor, and G. Edward Pendary, Associate Editor, three volumes. New York: McGraw-Hill Book Company, 1970.
- Herring, George C., General Editor. *Lyndon B. Johnson National Security Files, Agency File, 1963 - 1969*, microfilmed from the holdings of the Lyndon B. Johnson Library. Robert E. Lester, Project Coordinator. Bethesda, MD: University Publications of America, 1993.
- Johnson, Lyndon B. *Public Papers of the President, 1963-1964*. Washington, DC: USGPO, 1965.
- _____. *Public Papers of the President, 1965*. Washington, DC: USGPO, 1966.
- _____. *Public Papers of the President, 1966*. Washington, DC: USGPO, 1967.
- _____. *Public Papers of the President, 1967*. Washington, DC: USGPO, 1968.
- _____. *Public Papers of the President, 1968-69*. Washington, DC: USGPO, 1970.
- Keefer, Edward C. and David W. Mabon, editors. *Foreign Relations of the United States, 1958-1960, Volume 3, National Security Policy: Arms Control and Disarmament*. Washington, DC: USGPO, 1996.
- Kennedy, John F. *Public Papers of the President, 1961*. Washington, DC: USGPO, 1962.
- _____. *Public Papers of the President, 1962*. Washington, DC: USGPO, 1963.
- _____. *Public Papers of the President, 1963*. Washington, DC: USGPO, 1964.
- The John F. Kennedy Presidential Oral History Collection, Part I: The White House and Executive Departments*, microfilmed from the holdings of the John F. Kennedy Library. Frederick, MD: University Publications of America, 1988.
- Kesaris, Paul L., editor. *Presidential Campaigns: The John F. Kennedy 1960 Campaign, Part I: Polls, Issues, and Strategy*, a microfilm collection from the holdings of the John F. Kennedy Library. Part of the series *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenburg, General Editor. Frederick, MD: University Publications of America, Inc., 1986.
- _____. *Presidential Campaigns: The John F. Kennedy Campaign, Part II: Speeches, Press Conferences, and Debates*, *ibid.*

- _____. and Robert Lester. Project Coordinators. *President John F. Kennedy's Office Files, 1961-1963, Part I: Special Correspondence, Speeches, Legislative, and Press Conference Files*. In *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenberg, General Editor. Frederick, MD: University Publications of America, Inc., 1989. Also including *Part I: Countries*.
- Logsdon, John M. with Linda J. Lear, Jannelle Warren-Findley, Ray A. Williamson, and Dwayne A. Day, eds. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407. Washington, DC: USGPO, 1995.
- Logsdon, John M. with Dwayne A. Day and Roger D. Launius, eds. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume II: Relations with Other Organizations*, NASA SP-4407. Washington, DC: USGPO, 1996.
- Mabon, David and David Patterson, editors. *Foreign Relations of the United States, 1961-1963, Volume VII: Arms Control and Disarmament*. Washington, DC: USGPO, 1995.
- Miller, Susan, compiler. *Statements of John F. Kennedy on Space Exploration, 1952-1963*, NASA HHN-26, 1964. NHDRC.
- National Security Archive. *Military Uses of Space, 1945-1991*, Jeffrey Richelson, Consultant and Project Director. Alexandria, VA: The National Security Archive and Chadwyck-Healey, Inc., 1991. The total collection is 708 documents on 239 microfiche sheets. NSA MUS.
- _____. *Presidential Directives on National Security from Truman to Clinton*, Jeffrey Richelson, Consultant and Project Director. Alexandria, VA: The National Security Archive and Chadwyck-Healey, Inc., 1994. Approximately 1200 documents from this microfiche collection fall within this dissertation's time frame. NSA PD.
- The Papers of the President's Science and Advisory Committee, 1957-1961*, part of the series *Science and Technology: Research Collections in U.S. Public Policy*. Alex Roland, General Editor, microfilmed from the holdings of the Dwight D. Eisenhower Library. Bethesda, MD: University Publications of America, 1986.
- President Dwight D. Eisenhower's Office Files, 1953-1961, Part I: Eisenhower Administration Series*, microfilmed from the Dwight D. Eisenhower Library. Project Coordinator Robert E. Lester, part of the series *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William E. Leuchtenberg, General Editor. Bethesda, Maryland: University Publications of America, 1990.
- State Department. *Documents on Disarmament, 1963*. Washington, DC: USGPO, 1964.
- _____. *United States Treaties and Other International Agreements*, volume 18, part 3. Washington, DC: USGPO, 1967.
- Steury, Donald P., compiler. *Estimates on Soviet Military Power: 1954 to 1984*. Center for the Study of Intelligence. Washington, DC: CIA, December 1994.
- _____. Editor. *Intentions and Capabilities: Estimates on Soviet Strategic Forces, 1950-1983*. Center for the Study of Intelligence. Washington, DC: CIA, 1996.
- Wolf, Richard I. *The United States Air Force Basic Documents on Roles and Missions*. Washington, DC: Office of Air Force History, 1987.

Documents, Memoranda, Reports, Letters

Adair, Robert E., Major. USAF, Office of the Deputy Chief of Staff for R&D. *History of the Assistant for Manned Orbiting Laboratory: 1 January 1964 through 30 June 1964*. July 1964. IRIS 1002993, AFHSO.

Aeronautics and Astronautics Coordinating Board (AACB). Minutes of the 9th Meeting of the Aeronautics and Astronautics Coordinating Board. July 19. 1961. Box: AACB DOD/NASA. Box: Aeronautics and Astronautics Coordinating Board # 4, NHDRC.

_____. Launch Vehicle Panel. Minutes of the 9th Meeting of the Launch Vehicle Panel of the AACB, January 5, 1962. Folder: AACB Minutes & Reports, box: Arnold Levine, Selected Sources from the author, NHDRC.

_____. Report, *Intermediate-Class Launch Vehicles for Future DOD/NASA Manned Missions*, November 1968. Folder: AACB Launch Vehicle Study - 1968, box: Aeronautics and Astronautics Coordinating Board # 4, NHDRC.

_____. *Study of DOD and NASA Launch Vehicle Requirements*. No folder, box: Aeronautics and Astronautics Coordinating Board # 3, NHDRC.

_____. Manned Space Flight Panel. A Survey of Information Exchange Between NASA and DOD Relative to Manned Space Flight Activities, November 16, 1967, folder: Manned Space Flight Panel - AACB, box: Aeronautics and Astronautics Coordinating Board # 1, NHDRC.

_____. Supporting Space Research and Technology Panel, Ad Hoc Subpanel on Reusable Launch Vehicle Technology. Final Report, September 22, 1966. IRIS 1003002, AFHSO.

Air Force. "Air Force Competency in Space Operations," *Air Force Information Policy Letter for Commanders*, December 1, 1960. Volume XIV, Number 17. Folder: NASA-USAF Policy Relations, Other Agency Agreements subseries, Federal Agencies series, NHDRC .

_____. "NASA-USAF Cooperation," *Air Force Information Policy Letter for Commanders*, February 1, 1961. Volume XV, Number 3. Folder: USAF Space - AFCHO, DoD subseries, Federal Agencies series, NHDRC.

_____. *Air Force Information Policy Letter, Supplement for Commanders, Special Issue: Military Mission in Space, 1957-1962*. Director of Information. Office of the Secretary of the Air Force, dated only 1962. Folder: DOD Space Policy, DoD subseries, Federal Agencies series, NHDRC.

_____. Air Force Space Plan, September 1961. SPI unnumbered document.

_____. Briefing to the Armed Forces Policy Council, November 5, 1957. K140.11-3, AFHSO .

_____. *History of the Directorate of Space, Deputy Chief of Staff for Research and Development: January - June 1967, July 1967*. K140.01-1, AFHSO.

_____. Insert for the Record to the House DoD Subcommittee on Appropriations, April 1, 1965, IRIS 1002996, AFHSO.

_____. Memorandum on Space Objectives. to multiple recipients. with cover letter from CSAF LeMay. April 20, 1964. Folder: 208, Box B208, Curtis LeMay papers, LoC. cover letter and 1-2. Declassified at author's request.

- _____. *The Military Mission in Space: A Selection of Published Views, August 1962 - June 1963*. June 7, 1963. Folder: Military Mission in Space, DoD subseries, Federal Agencies series, NHDRC, no page numbers.
- _____. *Study Pertaining to the National Lunar Program, Volume I: Summary Report*. April 1964. IRIS 880570, AFHSO as well as K140.22-2, AFHRA. Declassified at author's request by the Joint Staff, December 30, 1996.
- _____. Air Force Systems Command. *Chronology of Early Air Force Man-in-Space Activity*. AFSC Historical Publications Series 65-21-1, 1965. NSA MUS document 446.
- _____. *Commander's Congressional Policy Book*, volume II, Tab C-1, Dynasoar Program (X-20). 168.7171-52, AFHRA. Declassified at author's request.
- _____. *The Genesis of the Air Force Systems Command*. Historical Publication 62-102260, 1962.
- _____. *History of the Aeronautical Systems Division, January-June 1962, Volume I (Narrative)*, AFSC Historical Publication Series 62-52-1, 1962. K243.011, AFHRA. Declassified at author's request.
- _____. Memorandum to Headquarters, USAF, Manned Electromagnetic Signal Detection Experiment for MOL, May 28, 1964. IRIS 1002993, AFHSO.
- _____. *Project Forecast: Policy and Military Considerations Report*, January 1964. K168.154-12, AFHRA. Declassified at author's request.
- _____. Space Systems Division, Headquarters. Partial Systems Package Plan for Military Orbital Development System (MODS) System Number 648C, June 4, 1962. K243.8636-9, AFHRA. Declassified at author's request.
- _____. *Primary Experiments Data for the Manned Orbiting Laboratory System (MOL) Program*, March 1965, SSMM-67. SPI unnumbered document.
- _____. Detachment 2, at NASA Manned Spacecraft Center. Report: Preliminary Evaluation - Program 631A, DOD/NASA Gemini Experiments, September 13, 1966. IRIS 1002997, AFHSO.
- _____. History Office. *Space and Missile Systems Organization: A Chronology, 1954-1979*. 1985.
- _____. Deputy Chief of Staff for Development. Memorandum for record, Subject: Comments on Project Vanguard, to Richard Horner, February 6, 1958. Folder: USAF Documents/ Correspondence (1957-1961), DoD subseries, Federal Agencies series, NHDRC.
- _____. Deputy Chief of Staff for Research and Development, Office of the Assistant for Manned Orbiting Laboratory (AFRMO). Congressional Preparation Instruction # 14, January 26, 1965. IRIS 1002996, AFHSO.
- _____. Memorandum for the Secretary of the Air Force, DOD/NASA Space Station Study Coordination. IRIS 1002993, AFHSO.
- _____. Report, Supporting Presentations During FY 1966 Congressional Budget Hearings. December 22, 1964, IRIS 1002995, AFHSO.

- _____. Unclassified Supporting Witness Statement. Manned Space Programs, March 9, 1965. IRIS 1002996, AFHSO.
- _____. Unclassified Supporting Witness Statement. April 1965. IRIS 1002996, AFHSO.
- _____. Director of Information. Office of the Secretary of the Air Force. *Air Force Information Policy Letter, Supplement for Commanders, Special Issue: Military Mission in Space, 1957-1962.*
- _____. Headquarters. Air Force Policy on Space, briefings for the Secretary of the Air Force, January 28-29, 1959. K140.11-13, AFHSO.
- _____. Current Status Report. Strategic Mission Area, 620 A-DYNA SOAR, February 1960. IRIS 1003000, AFHSO.
- _____. Development Directive for System 620A - DYNA SOAR (Step I), Hypersonic Glider System, October 12, 1960. IRIS 100300, AFHSO.
- _____. Memorandum for Record, Subject: Scientific Satellites, HQ USAF, April 5, 1955. K140.11-11. AFHRA.
- _____. Office of the CSAF. Record of Decision, Subject: The Dyna Soar Program, to Deputy CSAF for Development and Deputy CSAF for Material, November 17, 1959. Folder: Air Force Council Decisions 1959, box 25, Thomas White papers, LoC.
- _____. Research and Development Command, Ballistic Missiles Division. Air Force Ballistic Missile Division's Responsibility for "Man-in-Space" Program, K140.11-7, AFHSO.
- _____. Military Lunar Base Program or S.R. 183 Lunar Observatory Study, April 1960. SPI document 1212. Portions reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- _____. Outline of History of USAF Man-in-Space R&D Program, August 1962. K140.11-7, AFHSO.
- _____. USAF Manned Military Space Development Plan, Volume II. IRIS 1002991, AFHSO.
- _____. Office of the Secretary of the Air Force. *Air Force Information Fact Sheet, X-20 Dyna-Soar*, January 1963. Folder: X-20 Dyna-Soar Documentation, DoD subseries, Federal Agencies series, NHDRC.
- _____. Message to all subordinate commanders and offices, August 13, 1965. IRIS 1003002, AFHSO.
- _____. *The Military Mission in Space: A Selection of Published Views, August 1961-June 1963*, June 7, 1963. Folder: Military Mission in Space, DoD subseries, Federal Agencies series, NHDRC.
- Allnutt, Robert F., Associate Administrator for Administrative Affairs, NASA. Letter to Representative James G. Fulton, April 1, 1969. Folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC.
- American Rocket Society, Space Flight Technical Committee of the. "Space Flight Program," Report, October 10, 1957. Folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents. Eisenhower. Space Correspondence (1955-1960).
- Anderson, Clinton P. Letter to Kermit Gordon, November 9, 1964. Folder: Space Committee. MOL. box 915, Clinton Anderson papers, LoC.

- _____. Office of Senator. Press Release. December 20, 1964. Folder: Space Committee, MOL, box 915, Clinton Anderson papers. LoC.
- Anderson, John J., Colonel. USAF. Assistant for Manned Space Flight (AFRMO). Office of the Deputy Chief of Staff for R&D. Memorandum for Colonel Schultz. Air Force People in NASA. December 18, 1964. IRIS 1002995, AFHSO.
- _____. Memorandum for Record, Trip Report to General Electric. Simulation Tests, August 20, 1964. IRIS 1002994, AFHSO.
- _____. Memorandum for Record, Apollo X Final Briefing, November 10, 1964. IRIS 1002995, AFHSO.
- Army. Briefing on satellite reconnaissance system, November 19, 1957. Folder: Space, November 1957 (2), box 15, Office of the Special Assistant for Science and Technology (OSAST). White House Office, DDEL.
- _____. Ballistic Missile Agency. ABMA Report No. D-TR-1-58. Development Proposal for Project Adam. April 17, 1958. Folder: ABMA (Project Adam), DoD subseries, Federal Agencies series, NHDRC.
- _____. Redstone Arsenal, Scientific Information Center. *Project Horizon, Volume 1, Summary, A U.S. Army Study for the Establishment of a Lunar Military Outpost*. June 8, 1959, folder: Project Horizon, DoD subseries, Federal Agencies series, NHDRC.
- H. L. B. (only these initials survive as author). Cover letter to Lyndon Johnson, July 9, 1962. SPI document 1544.
- Barree, Alfred C., Lieutenant Colonel, Policy and Plans Group, Directorate of Space, Deputy Chief of Staff for R&D, USAF. Memorandum for the Record, Summary Report - DOD Support of Project Gemini, April 17, 1967. IRIS 1003006, AFHSO.
- Beckler, David Z., Special Assistant for Scientific Liaison, Office of Defense Mobilization. Memorandum to Director of the Office of Defense Mobilization Arthur S. Flemming. April 30, 1956. Folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC.
- _____. Memorandum for William Y. Elliott, April 18, 1956. Folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC.
- BeLieu, Kenneth. Memorandum for Lyndon Johnson, Governmental Organization for Space Activities, December 17, 1960. Folder: NASC 1960-1961, box: White House, National Aeronautics and Space Council, NHDRC.
- _____. Memorandum to Johnson, December 22, 1960, *ibid*.
- Bisplinghoff, Raymond L. Memorandum to Seamans, X-20 Program, November 22, 1963. Contained in *History of the Aeronautical Systems Division, Documents*. Declassified at author's request.
- Boone, W. Fred, Admiral. Retired, Deputy Associate Administrator for Defense Affairs. Memorandum for Mr. Hilburn, AAD, Special Support to Military Services re War in Southeast Asia, December 7, 1965. Folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC.

- _____. Memorandum to Webb, Project Gemini. January 9, 1963. Folder: Webb, declassified papers, 1961-1968, Webb subseries, Administrators series, NHDRC.
- _____. Report to Webb. NASA-DoD Relations. July 12, 1963. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- Boushey, Homer, Director of Advanced Technology and Deputy Chief of Staff for Development. Memorandum for the CSAF, Statement of Critical Problem Concerning SATURN, DYNA SOAR, and Air Force Space Responsibilities. October 30, 1959. Folder: X-20 Dyna-Soar Documentation, DoD subseries, Federal Agencies series, NHDRC.
- _____. Memorandum for Director of Requirements, Subject: Air Force Space Activities, January 8, 1959. K140.11-3, AFHSO.
- Brooks, Overton. Letter to T. Keith Glennan, February 14, 1961. IRIS 1002992, AFHSO.
- _____. Letter to John Kennedy, March 9, 1961. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- Brown, George S., Colonel, USAF, Executive to the CSAF. Memorandum for Record, July 25, 1958. Folder: Man in Space, DoD subseries, Federal Agencies series, NHDRC.
- Brown, Harold. Memorandum for the Secretary of Defense, Approaches to a Manned Military Space Program, November 14, 1963. Contained in *History of the Aeronautical Systems Division, Documents*, supra, 1-2. Declassified at author's request.
- _____. Memorandum for the Secretary of Defense, Evaluation of an Orbital Military Test Module, November 30, 1963, contained in *History of Aeronautical Systems Division, Documents*. Declassified at author's request.
- Brucker, Wilber. Army Position Paper, October 15, 1958. Folder: NASA/AOMC/JPL Transfer, box: Administrative History # 6, shelf VI-C-6, NHDRC.
- Brundage, Percival. Memorandum for the President, Subject: Project VANGUARD, April 30, 1957. Folder: Missiles and Satellites Vol. I (1), box 6, Department of Defense subseries, Subject series, Office of the Staff Secretary: Records, White House Office, DDEL.
- Bryant, F.B., Co-Chairman, NASA Management Working Group. Memorandum to Boone, Management Working Group Report: ETR Reimbursement Study, November 9, 1966. Folder: USAF Satellites (General), DoD subseries, Federal Agencies series, NHDRC.
- Buckley, Edmond C., Director of NASA Tracking and Data Acquisition. Memorandum to Boone. Ramifications of DOD Absorption of the GEMINI Program, January 8, 1963. Folder: DOD/USAF "Blue Gemini," DoD subseries, Federal Agencies series, NHDRC.
- Budget, Bureau of the, Military Division. Discussion paper, FY 1966 Budget Policy Considerations on Manned Orbiting Laboratory (MOL) and Extended Apollo Systems (EAS), November 19, 1964. Folder: NASA/MOL, DoD subseries, Federal Agencies series, NHDRC.
- _____. Draft Staff Report. Special Space Review. August 1962. Folder: DOD and NASA Space Programs 1962, box 20, NARA RG 200, Robert S. McNamara papers.

- _____. Memorandum from the Military Division of the BoB to the BoB Director. Status report on the space program, June 10, 1958. Folder: Pre-NASA Documents, NACA-DOD Talks, box: Administrative History, Pre-NASA Documents, NASA/DoD, NHDRC.
- _____. Memorandum from its Military Division, to a Dr. Reid, November 23, 1959. Folder: National Aeronautics and Space Council 1959, box: White House, National Aeronautics and Space Council, 1958-59, NHDRC.
- Bundy, McGeorge. Memorandum to Kennedy, Your 11 a.m. appointment with Jim Webb, September 18, 1963. SPI document 975.
- _____. Memorandum to Webb, February 23, 1962. Folder: III - National Security Council, box: White House, National Security Council, NHDRC.
- Bush, Vannevar. Letter to Webb, April 11, 1963. SPI document 978.
- Cabell, C.P., General, USAF, Retired. Consultant to the NASA Administrator. Memorandum, Presentation of A.A.P. Objectives, December 21, 1966. Folder: Apollo-AAP Planning, Skylab series, NHDRC.
- _____. Memorandum to Leonard Jaffee, Director, Space Applications Programs, Subject: Remote Sensors for Earth Oriented Purposes, June 21, 1968. Folder: Resolution from Space, DoD subseries, Federal Agencies series, NHDRC.
- Callaghan, Richard L., Special Assistant to the Administrator, NASA. Memorandum to William Moyers, Assistant to the President, May 12, 1964. Folder: Daily Reports to the White House, box: White House, NASA Reports to the White House, NHDRC.
- _____. NASA Associate Administrator for Legislative Affairs. Letter to Representative Lester L. Wolff, March 29, 1967. Folder: USAF Manned Orbiting Laboratory, DoD subseries, Federal Agencies series, NHDRC.
- Carter, Launor F., Chief Scientist of the Air Force. "An Interpretive Study of the Formulation of the Air Force Space Program," February 4, 1963. SPI unnumbered document.
- Central Intelligence Agency (CIA). Memorandum, Forecast of Soviet Space Spectaculars in Balance of 1964, May 30, 1964. Folder: LBJ Library/Declassified Space Documents, , box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC.
- _____. National Intelligence Estimate (NIE) 11-12-55, Soviet Guided Missile Capabilities and Probable Programs, December 20, 1955. Folder: CIA, box: Federal Agencies, CIA, National Intelligence Estimates, shelf XI-B-3, NHDRC.
- _____. NIE 11-5-58, Soviet Capabilities in Guided Missiles and Space Vehicles, August 19, 1958. Folder 13, box 1, RG 263, Records of the Central Intelligence Agency, NARA.
- _____. NIE 11-1-62, The Soviet Space Program, December 5, 1962. Folder: CIA National Intelligence Estimates, box: Federal Agencies, CIA, National Intelligence Estimates, shelf: XI-B-3, NHDRC.
- _____. NIE 11-1-67, The Soviet Space Program, March 2, 1967. Folder: CIA National Intelligence Estimates, shelf XI-B-3, box: Federal Agencies, CIA, National Intelligence Estimates, NHDRC.

Civilian Military Liaison Committee. Minutes of CMLC Meeting, January 13, 1959, folder: CMLC Minutes, January 1959, box: Civilian Military Liaison Committee, NHDRC.

_____. Minutes of CMLC Meeting, March 10, 1959, folder: CMLC Minutes, January 1959, box: Civilian Military Liaison Committee, NHDRC.

_____. Terms of Reference, October 22, 1958. Folder: CMLC Organization and Membership, box: Civilian Military Liaison Committee, NHDRC.

Clark, John E., Rear Admiral, Deputy Director, ARPA. Memorandum for Killian, Subject: Man-in-Space, July 23, 1958. Folder: Space Notebook, Piland, 1958-59 (4), box 16, OSAST, White House Office, DDEL.

Colchagoff, George, Major, ARDC. Memorandum to LtCol R.C. Anderson, New Research Systems, February 16, 1956. SPI document 350.

Davis, Howard S. Davis, Lieutenant Colonel, AFRMO, USAF. Memorandum for Record, MOL Presentation to Dr. Hall, DDR&E, October 8, 1964. IRIS 1002995, AFHSO.

Davis, Leighton I., Major General, DoD Representative for Project Mercury Support Operations. Report submitted to the Secretary of Defense. *Summary Report: DOD Support of Project Mercury, July 1959 - June 1963*, September 11, 1963. Folder: DOD Support of Mercury, Mercury series, NHDRC.

Department of Defense, Joint Chiefs of Staff. *Chronology of Significant Events and Decisions Relating to the U.S. Missile and Earth Satellite Development Programs, Supplement I, October 1957 through October 1958*. Historical Division, Joint Secretariat, December 15, 1958.

Department of Defense. Agreement between the Departments of Defense, Army, Navy and Air Force and the NASA Concerning the Detailing of Military Personnel for Service with NASA, April 13, 1959. SPI document 1537.

_____. Agreement Between the Department of Defense and National Aeronautics and Space Administration Concerning the Reimbursement of Costs, November 12, 1959. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.

_____. Background Briefing on the Manned Orbiting Laboratory, August 25, 196. NSA MUS document 452.

_____. DOD Directive 5160.32, Development of Space Systems, March 6, 1961. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.

_____. DoD Directive 5030.18, Department of Defense Support of the National Aeronautics and Space Administration, February 24, 1962. Folder: DOD Space Policy, DoD subseries, Federal Agencies series, NHDRC.

_____. DoD Directive S-5200.13, Security Policy for Military Space Programs, March 23, 1962. Folder: Defense 1962, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA.

_____. DoD Directive 5105.23, National Reconnaissance Office, March 27, 1964. *Exploring the Unknown, Volume I*, 373-75.

- _____. Manager for Manned Space Flight Support Operations. Overall Plan, Revised, Department of Defense Support for Project Gemini Operations. October 21, 1964. K243.04-34, AFHRA.
- _____. News Release No. 491-69, June 10, 1969. Folder: USAF MOL, 1968-, DoD subseries, Federal Agencies series, NHDRC.
- _____. Press Release No. 1556-63, December 10, 1963. Folder: Dyna-Soar, DoD subseries, Federal Agencies series, NHDRC.
- _____. Space Program Budget for Fiscal Years 1968 through 1970, December 31, 1968. Tab 5-7, Box 13, RG 220, Records of the National Aeronautics and Space Council. Declassified at author's request.
- _____. Office of the DDR&E. Memorandum for the Assistant Secretary of the Air Force for R&D, Manned Orbital Program, December 11, 1963, attachment 1. SPI document 1655.
- _____. Report, To Define a DOD Position on DYNA SOAR, February 20, 1962. Folder: Reading File, January - May 1962, box 114, RG 200, Robert S. McNamara papers, NARA. Declassified at author's request.
- _____. Report to McNamara, Manned Military Space Programs, Tab A, February 20, 1962. Folder: Reading File, January-May 1962, box 114, RG 200, Robert McNamara papers, NARA. Declassified at author's request.
- _____. Space Program Data Sheet on Manned Orbiting Laboratory, July 23, 1964. IRIS 1002993, AFHSO.
- Doolittle, James. Letter to Hugh Dryden, March 28, 1958. Folder: Testimony on Space Act, box: White House, Presidents, Eisenhower, National Aeronautics and Space Act, NHDRC.
- Douglas Aircraft Corporation, RAND Corporation. "Preliminary Design of an World-Circling Spaceship," Report No. SM-11827, May 2, 1946. *Exploring the Unknown, Volume 1*, 236-244.
- _____. Missile and Space Systems Division. DAC-58060, *Evaluation of the Usefulness of the MOL to Accomplish Early NASA Mission Objectives, volume 1, Summary*, October 1967. Multiple folders labeled: NASA-MOL, DoD subseries, Federal Agencies series, NHDRC.
- _____. *NASA Use of MOL for Extended Orbital Missions*, July 1968. Multiple folders labeled: NASA-MOL, DoD subseries, Federal Agencies series, NHDRC.
- Dryden, Hugh. Address to the Institute for Aeronautical Sciences, January 27, 1958. Folder: NACA to NASA Transition, box: White House, Presidents, Eisenhower, Space Documentation (1957-1960), NHDRC.
- _____. Letter to NASA Historian Eugene Emme, September 8, 1965, with attachment: Clotaire Wood of the NACA, Memorandum for Files, "Agreement" on a Recoverable Manned Satellite Test Vehicle, April 11, 1958. SPI document 484.
- _____. Letter to Killian, Manned Satellite Program, July 18, 1958. Folder: Space Notebook, Piland, 1958-59 (4), box 16, OSAST, White House Office, DDEL.
- _____. Letter to Zuckert, April 1, 1964. Folder: 1964, Manned Lunar Landing Program, Personnel, Military, box 43, Samuel Phillips papers, LoC.

- _____. Memorandum to James S. Lay, Executive Secretary, NSC, September 16, 1959. Folder: National Security Council, 1955-1980, box: White House, National Security Council, NHDRC.
- _____. Report to Johnson on the Soviet space program, March 1965. Folder: Eisenhower Library - Space Race, box: Presidents, Eisenhower, Photos, Presidential Library [document may be misfiled], NHDRC.
- _____. Speech to the American Aeronautics and Astronautics Society, December 30, 1961. Folder: NASC 1962-1972, box: White House, National Aeronautics and Space Council, NHDRC.
- _____. Statement to the House Committee on Science and Astronautics, May 17, 1962. Folder: Aeronautics and Astronautics Coordinating Board, box: Aeronautics and Astronautics Coordinating Board, NHDRC.
- Dulles, Allen. Memorandum for the President, August 3, 1960. Folder: Allen Dulles (1), box 13, Administration series, Ann Whitman file, DDEL.
- Eisenhower, Dwight D. Executive Order 10783, "Transferring Certain Functions from the Department of Defense to the National Aeronautics and Space Administration," October 1, 1958. SPI document 1124.
- _____. Letter to Robert Altschul, National Planning Association, October 25, 1957. Folder: October 1957 D.D.E Dictation, box 27, DDE Diary Series, Ann Whitman file, DDEL.
- _____. Letter to Thomas Gates, June 10, 1960. Folder: Reconnaissance Satellites 1960, box 15, Executive Secretary Subject File subseries, NSC Staff Papers Series, White House Office, DDEL.
- _____. Letter to T. Keith Glennan, January 14, 1960. Folder: Glennan, Dr. Keith - NASA, box 15, Administration series, Ann Whitman file, DDEL.
- _____. Letter to Professor Loyd Swenson, August 5, 1965, primary author of *This New Ocean*, the history of Project Mercury. NHDRC.
- _____. Letter to Senator Stuart Symington, October 29, 1957. Folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC.
- _____. Memorandum for the Secretary of Defense, March 24, 1958. K140.11-11, AFHSO.
- _____. Memorandum for the Secretary of Defense and the NACA Chairman, April 2, 1958. Folder: National Aeronautics and Space Administration (1), box 44, Confidential File, White House Central Files, DDEL.
- _____. Reprinted text of his speech to the Naval War College, October 3, 1961. In "Eisenhower at the Naval War College." *Naval Institute Proceedings* (June 1971): 18-24.
- _____. Executive Office of the President. *United States Aeronautics and Space Activities, January 1 - December 31, 1958: Year One of the Space Age*, first annual report of the President to Congress, February 1959.
- _____. *U.S. Aeronautics and Space Activities, January 1 to December 31, 1959*. Message from the President of the United States Transmitting the Second Annual Report of the Nation's Activities in the Fields of Aeronautics and Space, February 25, 1960.

- _____. *U.S. Aeronautics and Space Activities: January 1 to December 31, 1960. Report to Congress from the President of the United States, January 18, 1961.* NSA MUS document 324.
- Eisenhower, John S.D. Memcon, October 13, 1960. Folder: National Aeronautics and Space Administration (8), box 18, Alphabetical subseries, Subject series, Office of the Staff Secretary, DDEL.
- Evans, Harry L., Brigadier General, Vice Director of the MOL Program. Memorandum for the Deputy Chief of Staff for R&D, USAF, MOL Program Utilization of 128 Officers Assigned to NASA, December 6, 1965. IRIS 1003002, AFHSO.
- _____. Memorandum for the Air Force Personnel Director, Personnel Support for NASA, September 10, 1966. IRIS 1003002, AFHSO.
- Faget, Maxim, Aeronautical Research Engineer. Letter to Hugh Dryden, June 5, 1958, SPI document 1490.
- _____. Memorandum for NACA Associate Director, Subject: Attendance at ARDC briefing on "Man in Space" program, March 5, 1958, dated March 7, 1958. Folder: USAF MIS/MISS, DoD subseries, Federal Agencies series, NHDRC.
- Ferer, Benjamin H., Lieutenant Colonel, Office of the Assistant for Advanced Technology. Memorandum for Record, Subject: Summary of Opinions Believed to be Held by Drs. York and Charyk on Dyna Soar, March 14, 1960. IRIS 1003000, AFHSO.
- Ferguson, James, General, USAF, AFSC/CC. Speech on May 20, 1968, Science in a Synergistic Society. James Ferguson file, Biographical series, NHDRC.
- _____. Speech on Bioastronautics and Orbiting Space Stations, June 25, 1968. James Ferguson file, Biographical series, NHDRC.
- Flax, Alexander H., Assistant Secretary of the Air Force for R&D. Letter to George Mueller, August 28, 1964. IRIS 1002994, AFHSO.
- _____. Memorandum to Harold Brown, Manned Orbital Program, January 18, 1964. IRIS 1002995, AFHSO.
- _____. Memorandum to the DDR&E, Air Force Experiments on Apollo Flights, March 29, 1965. IRIS 1002996, AFHSO.
- _____. Memorandum to Eugene Zuckert, August 17, 1964. IRIS 1002994, AFHSO.
- Foster, John S., DDR&E. Memorandum to the Secretary of Defense, Reimbursement Issues, October 6, 1966. Folder: NASA-DoD Correspondence, box: Arnold Levine, Selected Sources from the author, NHDRC.
- _____. Statement to the Senate space committee, Department of Defense Activities in Space, 1967, March 26, 1968. Folder: Space 1968, box 917, Clinton Anderson papers, LoC.
- _____. Statement to the Senate Committee on Aeronautical and Space Sciences, March 26, 1968. John Foster file, Biographical Series, NHDRC.

- _____. and NASA Associate Administrator Homer E. Newell. Terms of Reference. NASA-DOD Review of Manned Space Flight Programs. August 6, 1968. Folder: NASA-DOD Agreements, box 10, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. and Robert Seamans. Joint letter to Charles Schultze. April 4, 1967. Folder: Air Force Eastern Test Range, DoD subseries, Federal Agencies series, NHDRC.
- Galloway, Eilene. "Problems of Congress in Formulating Outer Space Legislation," March 7, 1958. Reprinted in House Select Committee. *Astronautics and Space Exploration*, infra.
- _____. "Reasons for Confusion About Space Law," May 11, 1958. Folder: National Aeronautics and Space Act of 1958, box: White House, Presidents. Eisenhower, Space Act, NHDRC.
- Gardner, Trevor, Chairman. Report of the Air Force Space Study Committee, March 21, 1961. SPI document 1525.
- Garlock, Lyle S., Acting Secretary of the Air Force. Letter to DDR&E Herbert York, January 12, 1961. Folder: USAF Docs/Correspondence (1957-61), DoD subseries, Federal Agencies series, NHDRC.
- Gates, Thomas, Deputy Secretary of Defense. Memorandum for the service secretaries, DDR&E, Chairman of the JCS, Assistant Secretaries of Defense, and ARPA Director, Subject: Assignment of Responsibility for DOD Support of Project Mercury, August 10, 1959. IRIS 1002999, AFHSO.
- Gemini Program and Planning Board. Minutes of Meeting, February 1, 1965. IRIS 1002996, AFHSO.
- Gibbs, Asa, Colonel, Air Force Liaison Officer for Project Vanguard. Memorandum to General Putt. Subject: Vanguard-Jupiter C Firings, January 17, 1958. Folder: USAF Documents/Correspondence (1957-1961), DoD subseries, Federal Agencies series, NHDRC.
- Gilpatric, Roswell. Agreements for Support of Manned Lunar Landing Program, October 2, 1961. IRIS 1003003, AFHSO.
- _____. Letter to Clinton P. Anderson, September 27, 1963. Folder: III Armed Services, box 584, Clinton Anderson papers, LoC.
- _____. Statement Before the Senate Committee on Aeronautical and Space Sciences, June 13, 1962. Congressional Appearances, Roswell Gilpatric papers, Kennedy Library.
- _____. Testimony to the Senate space committee, November 1963. Inserted into the *Congressional Record*, November 20, 1963, p. 21350.
- Gilruth, Robert R., Director, NASA Manned Spacecraft Center. Letter to George E. Mueller, NASA Associate Administrator for Manned Spaceflight, March 25, 1966. SPI document 363.
- Ginter, R.D., Director, Office of Tracking and Data Acquisition, NASA. Memorandum to Deputy Associate Administrator for Defense Affairs, December 10, 1964. Folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC.
- _____. Director of Special Programs Office, NASA. Memorandum to the Deputy Associate Administrator for Advanced Research and Technology, October 4, 1968. folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC.

- _____. Memorandum to the Commanding General, Headquarters, Army Materiel Command, April 24, 1969. Folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC.
- _____. Memorandum to NASA Assistant Administrator for International Affairs, June 24, 1969. Folder: DOD NASA Support, DoD subseries, Federal Agencies series, NHDRC.
- Glennan, T. Keith. Letter to Overton Brooks, January 27, 1961, folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas White papers, LoC.
- _____. Letter to Deputy Administrator Hugh Dryden, August 28, 1959. Folder: Department of Defense Liaison, box: White House, Presidents, Eisenhower, DOD/CIA Information, NHDRC.
- _____. Letter to Thomas Gates, July 22, 1959. Folder: DOD Support of Mercury (1959-1963), Mercury series, NHDRC.
- _____. Letter to Thomas Gates, December 19, 1960. Folder: Defense, Department of, Glennan subseries, Administrators series, NHDRC.
- _____. Letter to Roy Johnson, November 17, 1958. Folder: ARPA (Documentation), DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to James R. Killian, Jr., Mission Assignments in the Space Field, June 22, 1959. Folder: PSAC Correspondence 1959, box: White House, President's Science Advisory Committee, NHDRC.
- _____. Letter to McElroy, October 15, 1958, SPI document 488.
- _____. Letter to McElroy, December 1, 1958. SPI document 486.
- _____. Letter to all military service secretaries and Deputy Secretary of Defense Gates, October 31, 1958. Folder: Organizational Developments - 1958 Miscellaneous, box: Administrative History # 6, shelf VI-C-6, NHDRC.
- _____. Letter to Representative James M. Quigley, April 4, 1960. Folder: April 1960, Chronological, Glennan subseries, Administrators series, NHDRC.
- _____. Letter to Thomas White, January 27, 1961. Folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas White papers, LoC.
- _____. Memorandum to NASA leaders, January 2, 1960. Folder: Chronological January 1960, Glennan subseries, Administrators series, NHDRC.
- _____. Notes on Discussion, How Important in the Current Scheme of things is the matter of competing in the Space Field aggressively and ultimately successfully with the Soviet Union," September 23, 1959. Folder: Glennan Speeches and Congressional Statements, Glennan subseries, Administrators series, NHDRC.
- _____. Speech to the Industrial College of the Armed Forces, November 20, 1959. Folder: Glennan Speeches and Congressional statements, Glennan subseries, Administrators series, NHDRC.
- _____. Statement to the NASA Authorization Subcommittee of the Senate Committee on Aeronautical and Space Sciences, March 28, 1960. Folder: Glennan Speeches and Congressional Statements, Glennan subseries, Administrators series, NHDRC.

- _____. Statement to the Subcommittee on Governmental Organization for Space Activities of the Senate Committee on Aeronautical and Space Sciences, March 24, 1959. Folder: Glennan Speeches and Congressional statements, Glennan subseries, Administrators series, NHDRC.
- _____. Statement to the Subcommittee on Independent Offices of the Senate Appropriations Committee, May 19, 1960. Folder: Glennan Speeches and Congressional Statements, Glennan subseries, Administrators series, NHDRC.
- Golovin, Nicholas E. Chronological File entry for October 30, 1961. Folder: Chronological file, July - September 1961, box 6, Nicholas Golovin papers, LoC. Item may be misfiled.
- _____. Chronological File entry for November 22, 1961, *ibid.* Item may be misfiled.
- _____. Chronological File entry, December 1-5, 1961. Folder: Chronological file, October-December 1961, box 6, Nicholas Golovin papers, LoC.
- _____. Memorandum to Donald Hornig, Fiscal Year 1966 Budget Policy on MOL/EAS Programs, November 27, 1964. Folder: Man in Space, 1964, box 401, RG 349, Records of the Office of Science and Technology, NARA. Declassified at author's request.
- _____. Memorandum for Donald Hornig, Coordination of NASA and USAF Programs in the Technology of Manned Space Flight, July 5, 1967. Folder: NASA/OMSF, box 716, RG 359, Records of the Office of Science and Technology, NARA. Declassified at author's request.
- _____. Memorandum to Jerome Wiesner, Suggestions Concerning the National Space Program, December 21, 1962. Folder: Withdrawn items, box 166, RG 359, Records of the Office of Science and Technology, NARA. Declassified at author's request.
- _____. and L. Kavanau. Memorandum to the Launch Vehicle Panel of the AACB, August 31, 1961. Folder: AACB Minutes & Reports, box: Arnold Levine, Selected Sources from the author, NHDRC.
- Goodpaster, Andrew. Memorandum of Conference with the President (memcon), March 30, 1956. Folder: Staff Memos: March 1956, box: 15, DDE Diary Series, Ann Whitman File, DDEL.
- _____. Memcon, April 5, 1956. Folder: Staff Memos: April 1956, DDE Diary Series, Ann Whitman File, DDEL.
- _____. Memcon, October 8, 1957, 5:00 p.m. Folder: October 1957 Staff Notes (2) box 27, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, October 8, 1957, 8:30 a.m., dated October 9, 1957. Folder: October 1957 Staff Notes (2), box 27, DDE Diary Series, Ann Whitman file, DDEL.
- _____. Memcon, October 11, 1957. Folder: October 1957 Staff Notes (2), box 27, DDE Diary series, Ann Whitman File, DDEL.
- _____. Memcon, October 30, 1957, dated October 31, 1957. Folder: October 1957 Staff Notes (1), box 27, DDE Diary Series, Ann Whitman file, DDEL.
- _____. Memcon, February 4, 1958. Folder: Staff Notes February 1958, box 30, DDE Diary series, Ann Whitman file, DDEL.

- _____. Memcon, March 11, 1958. Folder: Missiles, January-March 1958 (2), box 12, OSAST, White House Office, DDEL.
- _____. Memcon, July 17, 1958, dated July 18, 1958. Folder: Staff Memos - July 1958 (1), box 35, DDE Diary series, Ann Whitman files, DDEL.
- _____. Memcon, September 23, 1958. From *The Diaries of Dwight D. Eisenhower, 1953-1961*. Microfilmed from the Holdings of the Dwight D. Eisenhower Library, Robert Lester, Editor. Part of the *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*. William Leuchtenburg, General Editor. Bethesda, MD: University Publications of America, 1986. As deposited in the LoC.
- _____. Memcon, October 31, 1958. Folder: Staff Notes - October 1958, box 36, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, November 28, 1958, dated December 9, 1958. Folder: Budget, Military FY1960 (4), box 3, Department of Defense subseries, Subject series, Office of the Staff Secretary, White House Office, DDEL.
- _____. Memcon, December 18, 1958, dated December 22, 1958. Folder: Staff Notes - December 1958 (1), box 38, DDE Diary Series, Ann Whitman file, DDEL.
- _____. Memcon, February 17, 1959, dated February 24, 1959. Folder: Staff Notes February 1959 (1), box 39, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, September 16, 1959. Folder: Department of Defense, Vol. III (8), box 2, Department of Defense subseries, Subject series, Office of the Staff Secretary, White House Office, DDEL.
- _____. Memcon, September 21, 1959, dated September 23, 1959. Folder: Staff Notes September 1959 (1), box 44, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, October 21, 1959, dated October 23, 1959. Folder: Meetings with the President, box 12, OSAST, White House Office, DDEL.
- _____. Memcon, October 26, 1959, dated October 30, 1959. Folder: Staff Notes - October 1959 (1), box 45, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, 16 November 1959, dated December 2, 1959. Folder: Budget, Military FY 1961 (4), Department of Defense subseries, Subject series, Office of the Staff Secretary, White House Office, DDEL.
- _____. Memcon, November 17, 1959, dated December 1, 1959. Folder: Staff Notes - November 1959 (2), box 45, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, November 18, 1959, but dated January 20, 1960. Folder: Department of Defense, Volume III (8), box 2, Department of Defense subseries, Subject series, Office of the Staff Secretary: Records, White House Office, DDEL.
- _____. Memcon, November 21, 1959, dated January 2, 1960. Folder: Staff Notes - November 1959 (2), box 45, DDE Diary series, Ann Whitman file, DDEL.
- _____. Memcon, January 11, 1960, dated January 14, 1960. Folder: Staff Notes - January 1960 (2), box 47, DDE Diary series, Ann Whitman file, DDEL.

- _____. Memcon. April 8, 1960. Folder: Staff Notes - April 1960 (2), box 49, DDE Diary Series, Ann Whitman file, DDEL.
- Gordon, Kermit, BoB Director. Memorandum for the Record, Manned Orbiting Laboratory, December 10, 1964. SPI unnumbered document.
- Gray, Edward Z., Director for Advanced Manned Missions Program, NASA. Letter to George Mueller, Associate Administrator for Manned Space Flight, August 31, 1964. Folder: NASA-DOD, box: Arnold Levine, Selected Sources from the author, NHDRC.
- _____. Memorandum to W. Fred Boone, Response to Space Council's Questions on MOL, July 21, 1965. Folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC.
- Gray, Gordon. Memorandum of Meeting with the President, August 3, 1959, dated August 5, 1959. Folder: Meetings with the President: June-December 1959 (3), box 4, Presidential subseries, Special Assistants series, OSANSA, DDEL.
- _____. Memorandum of Meeting with the President, November 8, 1960. Folder: 1960 - Meetings with the President - Vol 2 (4), box 5, Presidential subseries, Special Assistants series, OSANSA, DDEL.
- Greenfield, S.M. and W.W. Kellogg. *Inquiry Into the Feasibility of Weather Reconnaissance from a Satellite Vehicle*, RAND Report R-218, April 1951. Folder: Rand Reports, box 99, Curtis LeMay papers, Library of Congress.
- Grosse, A.V. "Report on the Present State of the Satellite Problem," The Research Institute of Temple University, August 25, 1953. *Exploring the Unknown, Volume I*, 267-69.
- Hagerty, James. Statement by, July 29, 1955. Folder: Eisenhower - Space Exploration (1952-63), box: White House, Presidents, Eisenhower, Space Statements, NHDRC.
- _____. Transcript of press conference, October 5, 1957. James C. Hagerty papers, DDEL, on file with the personal papers of the Historian, NHDRC.
- Hale, R.W. Memorandum for Welsh, Subject: NASA - Personnel, November 19, 1962. Folder: National Aeronautics and Space Administration, box 22, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Memorandum for Edward Welsh, NASC Executive Secretary, March 7, 1966, Space Council Meeting, March 3. Folder: NASC Meeting, March 3, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA.
- Hall, Albert G., Deputy DDR&E for Space. Speech on The Objectives of the Military Space Program, February 5, 1964. Albert G. Hall file, Biographical series, NHDRC.
- _____. Speech, The Military Space Program, 1965-1975, July 29, 1965. Reprinted and issued as DOD News Release No. 488-65. Albert Hall file, Biographical Series, NHDRC.
- Harlow, Bryce. Memorandum for Record, Subject: January 13, 1960 meeting of the President with Styles Bridges, Glennan, and Lyndon Johnson. Folder: Staff Notes - January 1960 (2), box 47, DDE Diary, Ann Whitman file, DDEL.

- _____. Memorandum for Record. Subject: January 14, 1960 Meeting with Overton Brooks, John McCormack, Joe Martin, and Glennan. Folder: Staff Notes - January 1960 (2), box 47, DDE Diary, Ann Whitman file, DDEL.
- Harvey, Mose. Memorandum for Dr. Seamans, The MOL Problem, July 2, 1965. Safe # 1, drawer 2, folder: MOL/AES, 1-3. Declassified at author's request; therefore, this document could have been integrated into the NHDRC's main unclassified collection by NASA archival staff.
- Henry, Beverly Z., Jr., Aeronautical Research Engineer, NASA. Memorandum for NASA Associate Director, Subject: Langley Manned Space Laboratory Effort, October 5, 1959. Folder: Skylab/AAP Documentation 1959, Skylab series, NHDRC.
- Hilburn, Earl, NASA Deputy Associate Administrator for Industry Affairs. Memorandum to the Associate Administrator, NASA Position with Respect to Proposed DOD/MOL Program, July 1, 1965. Folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC.
- Holaday, William. Memorandum for Record, Subject: Civilian Military Liaison Committee, July 22, 1959. Folder: CMLC, box: Civilian Military Liaison Committee, NHDRC.
- _____. Memorandum for the Secretary of Defense and NASA Administrator, Subject: A National Space Vehicle Program, September 30, 1959. Folder: CMLC, box: Civilian Military Liaison Committee, NHDRC.
- _____. Transcript of testimony before the House Committee on Science and Astronautics, March 10, 1960. Folder: CMLC, box: Civilian Military Liaison Committee, NHDRC.
- Humphrey, Hubert. Opening Statement by the Vice President, NASC Meeting, Discussion of FY67 Budgets, March 3, 1966. Folder: NASC Meeting March 3, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Introductory Statement by the Vice President, NASC Meeting November 15, 1966. Folder: NASC Meeting, November 15, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Statement by the Vice President, NASC Meeting, June 22, 1967. Folder: NASC Meeting, June 22, 1967, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA.
- Johnson, Lyndon B. Letters to McNamara and Webb, July 22, 1963. Folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified Items, NHDRC.
- _____. Memorandum for the Heads of Departments and Agencies, November 30, 1963. Folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC.
- _____. Memorandum to Kennedy, April 28, 1961. *Exploring the Unknown, Volume I*, 427-29.
- _____. Memorandum to Kennedy, May 13, 1963. *Exploring the Unknown, Volume I*, 468-473.
- _____. Memorandum on Proposed Amendments to the Space Act, HR 12049, reprinted in *Congressional Record*, August 31, 1960.
- _____. Memorandum to Webb, September 29, 1967. Folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC.

- _____. Statement of Democratic Leader Lyndon B. Johnson to the Meeting of the Democratic Conference on January 7, 1958. Folder: Armed Services, ICBM - Sputnik, box 584, Clinton P. Anderson papers, Library of Congress.
- _____. Statement opening the Vice President's Ad Hoc Meeting on Space, May 3, 1961. SPI document 1121. *Exploring the Unknown, Volume I*, 433-39 reprints the transcript of the meeting but not Johnson's opening statement.
- _____. Executive Office of the President. *U.S. Aeronautics and Space Activities, 1963*. Report to the Congress from the President of the United States, January 27, 1964. NSA MUS document 329.
- _____. *United States Aeronautics and Space Activities, 1964*, January 27, 1965. Copy available at NHDRC.
- _____. *US Aeronautics and Space Activities, 1965*, Report to Congress from the President, January 31, 1966. NSA MUS document 332.
- _____. *US Aeronautics and Space Activities, 1966*. Report to the Congress from the President, January 1, 1967. NSA MUS document 333.
- _____. *US Aeronautics and Space Activities, 1967*. Report to the Congress from the President, January 1968. NSA MUS document 334.
- _____. *US Aeronautics and Space Activities, 1968*. Report to the Congress from the President, January 1969. NSA MUS document 335.
- _____. *Aeronautics and Space Report of the President, 1969*, Report to the Congress from the President, January 1970, copy available in NHDRC.
- Johnson, Roy. Memorandum to all ARPA staff, ARPA Policy Respecting DoD/NASA Relationships, October 14, 1958. SPI document 1439.
- Johnson, S. Paul. Memorandum for Killian, Preliminary Observations on the Organization for the Exploitation of Outer Space, February 21, 1958. *Exploring the Unknown, Volume I*, 632-637.
- Johnson, U. Alexis, Representative of the Department of State. Concurred to by representatives of the DoD, CIA, ACDA, NRO, NASA and OST, Report of the NSAM 156 Committee, July 2, 1962. Folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA. Declassification date: December 31, 1996.
- Joint Research and Development Board. Minutes of meeting, 4th meeting of the Joint Research and Development Board of the War and Navy Departments, March 6, 1947. Folder: Navy/BuAer: Earth Satellite Vehicle, DoD subseries, Federal Agencies series, NHDRC.
- Kaplan, Joseph. Letter to Alan Waterman, March 14, 1955. Folder: OCB 000.91 Natural & Physical Sciences (2), box: 11, OCB Central Files subseries, NSC: Staff Papers series, White House Office, DDEL.
- Kecskemeti, Paul, RAND Corporation. "The Satellite Rocket Vehicle: Political and Psychological Problems," RAND Report RM-567, October 5, 1950. SPI document 1284.
- Kennedy, John F. Letter to Overton Brooks, March 23, 1961. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.

- _____. Letter to Khrushchev, February 22, 1962. Folder: Kennedy Correspondence (NASA). White House, Presidents, Kennedy, May 25, 1961 speech through JFK/NASA Correspondence, NHDRC.
- _____. Memorandum for Vice President Lyndon B. Johnson. April 20, 1961. *Exploring the Unknown, Volume I*, 424.
- _____. Memorandum for Johnson. April 9, 1963. *Exploring the Unknown, Volume I*, 467-68.
- _____. Executive Office of the President. *U.S. Aeronautics and Space Activities, 1961*. Message to the Congress from the President of the United States. January 31, 1962. NSA MUS document 326.
- Killian, James R., Jr. A Brief Summary prepared for the first NASC meeting, August 5, 1958. Tab 1-2, box 1, Record Group (RG) 200, National Archives and Record Administration (NARA), 14. Declassified at author's request.
- _____. Memorandum on Organizational Alternatives for Space Research and Development, no addressed party, December 30, 1957. *Exploring the Unknown, Volume I*, 628-31.
- _____. Speech to the Dallas Council on World Affairs, September 23, 1960. Folder: Ad Hoc Man-in-Space Panel, box 65, Subject Files, 1957-62, RG 359, Office of Science and Technology, NARA.
- Killian, James R., Jr., Percival Brundage, Nelson Rockefeller. Memorandum for the President: Organization for Civil Space Programs, March 5, 1958. Folder: No. 174, Space Program, 1958-60, box 169, President's Advisory Committee on Government Organization, DDEL.
- Kistiakowsky, George B. Memorandum to Staff Secretary Goodpaster, Coordination of Satellite and Space Vehicle Operations. Folder: Kistiakowsky (2), box 23, Administration series, Ann Whitman file, DDEL.
- Lapp, Ralph. Advisory Committee on Science and Technology of the Democratic Advisory Council. Position Paper on Space Research," prepared for Senator John F. Kennedy, September 7, 1960. Papers of the Historian, NHDRC.
- Lapp, R.E., Frank McClure, and Trevor Gardner. Position Paper on Space Research, August 31, 1960. In Paul L. Kesaris, *Presidential Campaigns: The John F. Kennedy 1960 Campaign, Part I: Polls, Issues, and Strategy*, a microfilm collection from the holdings of the John F. Kennedy Library. Part of the series *Research Collections in American Politics: Microforms from Major Archival and Manuscript Collections*, William Leuchtenburg, General Editor. Frederick, MD: University Publications of America, Inc., 1986, reel 4.
- Large Launch Vehicle Planning Group. Summary Report: NASA-DoD Large Launch Vehicle Planning Group, September 24, 1962. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- Lehrer, Max. Senate staffer for Lyndon Johnson. Memorandum to Johnson, The Record on Space. October 31, 1960. SPI document 498.
- LeMay, Curtis, Vice CSAF. Letter to Zuckert, serving as a cover for the revised Air Force Five Year Space Plan, October 19, 1962. Folder: 6 - 1962, Box B128, Curtis LeMay papers, LoC.
- _____. Status Report on Project Dynasoar, to CSAF White, December 15, 1959. Folder: 4-5 Missiles/Space/Nuclear, box 36, Thomas White papers, LoC.

Lloyd, O.B., Jr., Director, NASA Office of Public Services and Information. Letter to the Editor. *Missiles and Rockets* (May 14, 1962): 7.

Lockheed Corporation. Lockheed Press Release. Corona Program Profile, May 1995. SPI unnumbered document.

Low, George M., Director, Spacecraft and Flight Missions, Office of Manned Space Flight, NASA. Memorandum to Director of the Manned Spacecraft Center, NASA-DoD Operational and Management Plan for Gemini, February 7, 1962. With the attachment. Agreement between NASA and the DoD on the Gemini Program, signed by Rubel and Seamans, January 29, 1962. SPI document 450.

Macdonald, Duncan E. Report, Comments, Observations and Recommendations re Reconnaissance and Photo Optical Programs for MOL, to Brian O'Brien, Chairman, NAS Advisory Committee to USAF Systems Command, for transmission to General Schriever, May 27, 1966. 168.7171-158, AFHRA.

MacIntyre, Malcolm. Memorandum to ARPA Director Roy Johnson, Advanced Program Areas for Military Space Systems, April 14, 1959. SPI document 274.

Martin, John L., Colonel, Deputy Director of Advanced Technology, Deputy Chief of Staff for Development. Report to Secretary of the Air Force, Legislative Liaison, on Project Mercury, November 10, 1959, K140.11-7, AFHSO.

McElroy, Neil. Memorandum for the Chairman of the Joint Chiefs of Staff, Subject: Coordination of Satellite and Space Vehicle Operations, September 18, 1959. Reprinted in *Briefing Book for Air Force witnesses before the House Committee on Science and Astronautics on the Subject of DOD Space Directive 5160.32*. K160.8636-4, AFHSO, 1961.

_____. Transcript of remarks at Secretary of Defense luncheon, November 1, 1957. NSA MUS document 270.

McMillan, Brockway, Assistant Secretary of the Air Force for Research and Development. Memorandum to Zuckert, March 15, 1963. Documents in the possession of Major Roy Houchin. AFHSO/Pentagon.

_____. Undersecretary of the Air Force. Memorandum for Colonel Schultz, Assistant for Manned Orbiting Laboratory, AFRMO, Subject: MOL Experiments on Electromagnetic Signal Detection, July 2, 1964. IRIS 1002993, AFHSO.

_____. Undersecretary of the Air Force, and Robert C. Seamans, NASA Associate Administrator. DOD/NASA Agreement on the NASA Manned Lunar Mapping and Survey Program, April 20, 1964. SPI document 228.

McNamara, Robert S. Proposed Agreement between the Department of Defense and the National Aeronautics and Space Administration, Gemini Program Management, January 12, 1963. SPI document 888.

_____. Cover letter to DoD Directive 5160.32, March 6, 1961. Folder: Defense, 1961, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA.

_____. Letter to Webb, September 16, 1963. Logsdon, et. al. editors, *Exploring the Unknown, Volume II: Relations with Other Organizations*, supra.

- _____. Letter to Webb, September 25, 1964. IRIS 1003002. AFHSO.
- _____. Letter to Webb, November 2, 1966. Folder: NASA-DoD Correspondence, box: Arnold Levine, Selected Sources from the author, NHDRC.
- _____. Two memoranda to Harold Brown, January 18 and 19, 1963. Folder: 6 - 1963, box B129, Curtis LeMay papers. Library of Congress.
- _____. Memorandum to Johnson, Brief Analysis of Department of Defense Space Program efforts, April 21, 1961. *Exploring the Unknown, Volume I*, 424-26.
- _____. Memorandum to Eugene Zuckert, undated but probably October 14 or 15, 1961. 168.7050-54, AFHRA, 1. Declassified at author's request.
- _____. Memorandum for the Secretary of the Air Force [Zuckert], The Air Force Manned Military Space Program, February 22, 1962. Folder: Reading File, January-May 1962, box 114, RG 200, Robert McNamara papers, NARA, 2. Declassified at author's request.
- _____. Memorandum for the Secretary of the Air Force, March 15, 1963. Folder: Reading File, February-May 1963, box 117, RG 200, Robert McNamara papers, NARA. Declassified at author's request.
- _____. Memorandum for the Secretary of the Air Force, A National Orbital Space Station Program, May 25, 1963. Folder: May 31-May 18, 1963, Reading File, box 117, RG 200, Robert McNamara papers, NARA, 1. Declassified at author's request.
- _____. Memorandum for the Secretary of the Air Force, Recommendation of the Gemini Program and Planning Board, June 20, 1963. Folder: Reading File, June 20-June 29, 1963, box 118, RG 200, Robert McNamara papers, NARA.
- _____. Memorandum for the Secretary of the Air Force [Harold Brown], December 9, 1967. Folder: Reading file: October 1967 - February 1968, box 131, RG 200, Robert McNamara papers, NARA. Declassified at author's request.
- _____. Memorandum for the Vice President, Space Stations, August 9, 1963. Folder: NASC, 1962-1972, box: National Aeronautics and Space Council, NHDRC.
- _____. Note to author after several requests for oral history interview. October 15, 1996.
- _____. Press Conference, June 23, 1961. Folder: News Conferences and Press Briefings, 1961, box 182, RG 200, Robert McNamara papers, NARA.
- _____. Report to Lyndon Johnson, May 3, 1963, National Space Program. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- _____. Statement before the House Armed Services Committee on the 1965 Defense Budget, January 27, 1964. Folder: Unclassified Statement, FY65, box 32, RG 200, Robert McNamara papers, NARA.
- _____. Statement before the House Armed Services Committee on the 1966 Defense Budget, February 18, 1965. Folder: Unclassified Statement, 1966 Defense Budget, box 44, RG 200, Robert McNamara papers, NARA.

- _____. Statement before a Joint Session of the Senate Armed Services Committee and the Senate Subcommittee on Department of Defense Appropriations on the FY 1968 Defense Budget. January 23, 1967. Folder: Unclassified Statement, box 69, RG 200, Robert McNamara papers, NARA. Declassified at author's request.
- _____. Statement before the Senate Armed Services Committee. April 4, 1961. Folder: Statements to Congressional Committees, FY62, box 11, RG 200, Robert S. McNamara papers, NARA.
- _____. Statement before the Senate Armed Services Committee. January 19, 1962. Folder: Miscellaneous Budget, box 114, RG 200, Robert S. McNamara papers, NARA, 97. Declassified at author's request.
- _____. Statement before the Senate Armed Services Committee on the FY 1964-68 Defense Program. January 21, 1963. Folder: Statement to Congress r.e. 1964 budget, box 22, RG 200, Robert McNamara papers, NARA.
- _____. Transcript of News Conference, December 12, 1964. Folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. and James Webb. Joint Statement, Decisions on Manned Orbiting Laboratory and Related Matters." January 25, 1965. Folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA.
- Miller, George. Speech. *Congressional Record*, September 6, 1962, p. 18670-18674.
- Miller, James E., Colonel, Director of Program Support, AFSC. Report to the Directorate of NASA Program Support, Deputy Commander for Space, AFSC, USAF. USAF Personnel on Duty with NASA, December 9, 1965. IRIS 1003002, AFHSO.
- Minnich, L.A. Legislative Leadership meeting, Supplementary Notes. January 7, 1958. Folder: January 1958 Staff Notes, box 30, DDE Diary Series, Ann Whitman file, DDEL.
- _____. Legislative Leadership Meeting - Supplementary Notes, February 4, 1958. Folder: Staff Notes, February 1958, box 30, DDE Diary series, Ann Whitman file, DDEL.
- _____. Notes on Legislative Leadership Meeting, March 10, 1959. Folder: Staff Notes - March 1-15 (1), box 39, DDE Diary series, Ann Whitman file, DDEL.
- Minutes of Cabinet Meeting. October 18, 1957. Folder: Cabinet Meeting of October 18, 1957, box 9, Cabinet series, Ann Whitman file, DDEL.
- _____. January 3, 1958. Folder: Jan 1958 Staff Notes, box 30, DDE Diary Series, Ann Whitman File, DDEL.
- Montgomery, R.M., Major General, Assistant Vice Chief of Staff. Memorandum to multiple USAF recipients, Air Force Implementation of DOD Directive 5030.18, April 23, 1962. IRIS 1003001, AFHSO.
- Moore, W. L., Colonel, Wright Air Development Division. Dyna-Soar Program Status, remarks at the USAF-NASA Conference on Lifting Manned Hypervelocity and Reentry Vehicles, Part II, April 11-14, 1960. IRIS 1003000, AFHSO.
- Mrozinski, R.V., NASC. Memorandum to William Moore, Director of Technical Staff, NASA, April 1, 1968. Folder: MOL 1968 & 1969, DoD subseries, Federal Agencies series, NHDRC.

- Mueller, George E., Deputy Associate Administrator for Manned Space Flight. Letter to Webb, Utilization of Air Force Program Management Personnel. September 26, 1963. Folder: 1964, Manned Lunar Landing Program, box 43. Samuel Phillips papers. LoC.
- _____. Memorandum to W. Fred Boone. NASA Hardware Support to the MOL Program. May 3, 1966. Folder: USAF Manned Orbiting Laboratory. DoD subseries, Federal Agencies series, NHDRC.
- _____. Memorandum to the NASA Associate Administrator, January 15, 1964. Folder: NASA-DOD, box: Arnold S. Levine, Selected Sources from the author, NHDRC.
- National Advisory Committee on Aeronautics. Agreement, Air Force Support for NACA Research Activities, July 8, 1957. Folder: Minutes of CMLC Meeting - January 13, 1959, box: Civilian Military Liaison Committee, NHDRC.
- _____. Minutes of Meeting, February 21, 1957. Folder: Dyna-Soar. DoD subseries, Federal Agencies series, NHDRC.
- _____. NACA Research on Missiles, 1958. Folder: Testimony on Space Act, box: White House, Presidents, Eisenhower, National Aeronautics and Space Act (cont.). Space Act Testimony, NHDRC.
- _____. A National Research Program for Space Technology. January 14, 1958. Folder: NACA documents, box: Administrative History, Pre-NASA Documents, NASA/DoD, shelf VI-C-6, NHDRC.
- _____. On Assignment to the National Advisory Committee for Aeronautics Certain Officers of the United States Army for Reserve for Extended Active Duty, July 27, 1956 and similar agreements for the Air Force and Navy, same date. No folder, box: Civilian-Military Liaison Committee, NHDRC.
- _____. Wartime Role of NACA In Support of Department of Defense, March 21, 1957. Folder: Copies of Agreements. DoD subseries, Federal Agencies series, NHDRC.
- NACA Chairman and Secretary of Defense. Joint memorandum to the President. dated only April 1958. Folder: Department of Defense Liaison, box: White House, Presidents, Eisenhower, DOD/CIA Information, NHDRC.
- National Aeronautics and Space Administration. *A National Space Vehicle Program: A Report to the President*, January 27, 1959. Folder: NASC Papers (1), box 5, OCB Secretariat Series, NSC Staff series, White House Office, DDEL.
- _____. *Aeronautical and Astronautical Events of 1961*. Washington, DC: USGPO, 1962.
- _____. *Aeronautics and Astronautics, 1965: Chronology on Science, Technology, and Policy*. Washington, DC: USGPO, 1966.
- _____. *Astronautics and Aeronautics, 1966: Chronology on Science, Technology, and Policy*, NASA SP-4007. Washington, DC: USGPO, 1967.
- _____. *Aeronautics and Space Report of the President, Fiscal Year 1995 Activities*. Washington, DC: USGPO, 1996.

- _____. Agreement Between the Department of the Air Force and the National Aeronautics and Space Administration Concerning Air Force Assistance to NASA in the Procurement of Research and Development and/or the Performance of Field Service Functions. October 15, 1959. Folder: Copies of Agreements. DoD subseries. Federal Agencies series. NHDRC.
- _____. Agreement with the Air Force. GEMINI B/MOL Control Center and Network Support Procedures, January 28, 1965. Folder: MOL 1965-67, DoD subseries. Federal Agencies series. NHDRC.
- _____. Answers to Vice President Hubert Humprey's 21 Questions on MOL. July 29, 1965. Safe # 1, drawer 2, folder: MOL/AES. Declassified at author's request; therefore, this document could have been integrated into the NHDRC's main unclassified collection by NASA archival staff.
- _____. Chronology. NASA Participation in X-20 Project. March 13, 1963. Folder: Dyna Soar Proposals & Evaluation, DoD subseries. Federal Agencies series. NHDRC.
- _____. Considerations Preparatory to Establishing a NASA Position on ABMA. August 20, 1959. Folder: NASA/AOMC/JPL Transfer. box: Administrative History # 6, shelf VI-C-6, NHDRC.
- _____. FY1969 Budget Briefing. January 29, 1968. Folder: Webb Budget Briefing. Webb subseries. Administrators series. NHDRC.
- _____. Internal position paper on Project Gemini. marked "Confidential." January 7, 1963. Folder: Webb, declassified papers, 1961-1968, Webb subseries. Administrators series. NHDRC.
- _____. Inventory of NASA Interagency Relationships. October 13, 1967. Folder: Copies of Agreements. DoD subseries. Federal Agencies series. NHDRC.
- _____. Minutes from the Williamsburg Conference. October 21, 1960. Folder: Aeronautics and Astronautics Coordinating Board. box: Aeronautics and Astronautics Coordinating Board. NHDRC.
- _____. NASA Dyna Soar Coordinating Committee. Minutes of meeting, March 30, 1962. As an attachment to a memorandum from a NASA official Mr. Dixon, to Deputy Administrator Dryden, NASA Participation in Dyna Soar Program, April 2, 1962. Folder: X-20 Correspondence, DoD subseries. Federal Agencies series. NHDRC.
- _____. News Release No. 61-115, May 25, 1961. folder: JFK - Miscellaneous Clippings, box: White House, Presidents, Kennedy, Biography materials, NHDRC.
- _____. News Release No. 62-249, November 21, 1962. SPI document 1580.
- _____. News Release No. 64-78, NASA Selects Gemini Experiments. April 15, 1964. Folder: DOD/USAF "Blue Gemini," DoD subseries. Federal Agencies series. NHDRC.
- _____. News Release. Decisions on Manned Orbiting Laboratory and Related Matters. January 25, 1965. Folder: USAF Manned Orbiting Laboratory, DoD subseries. Federal Agencies series. NHDRC.
- _____. Position Paper, Summary on Saturn I/Apollo vs. Titan III/MOL for the Apollo Applications Program, January 6, 1967. Folder: NASA-MOL, DoD subseries. Federal Agencies series. NHDRC.

- _____. Position Paper on the Report of the Space Panel of the President's Science Advisory Committee. January 26, 1968. Folder: PSAC Correspondence. 1968, box: White House. President's Science Advisory Committee, NHDRC.
- _____. *Preliminary History of NASA: 1963-1969*. Final Edition. Administrative Histories Project, January 15, 1969.
- _____. *Selected Statements of President Kennedy on Defense Topics, December 1957 - August 1, 1962*. August 15, 1962. Folder: Kennedy - Statements on Defense, box: White House, Presidents. Kennedy, Defense Statements. NHDRC.
- _____. Manned Spacecraft Center. *Gemini Program Mission Support: Gemini V*, August 1965. Box: Gemini Program, GT4 & GT5, shelf VII-A-4, NHDRC.
- _____. Office of Manned Space Flight. Report. Complementary Nature of AAP and MOL Programs?, June 10, 1968. Folder: Comparison of AAP and MOL, box 114, James Webb papers, HSTL.
- _____. Office of Programming. Program Review Document, *Manned Space Science and Advanced Manned Missions*, October 7, 1965. Shelf X-A-4, box: Program Reviews (November 23, 1963 - February 15, 1966), NHDRC.
- _____. Office of Program Planning and Evaluation. NASA Long Range Plan, January 12, 1961. Folder: NASA Long Range Plan, box 1, National Aeronautics and Space Administration: Documents Relating to the space program, 1953-62, DDEL.
- _____. Long Range Plan, January 1962. Folder: NASA Long Range Plan, box 1, National Aeronautics and Space Administration: Documents relating to the space program, 1953-1962, DDEL.
- National Aeronautics and Space Council. Minutes of Meeting, December 3, 1958. Folder: National Aeronautics and Space Council (Unclassified) 1958," box: White House, National Aeronautics and Space Council, 1958-59, NHDRC.
- _____. Minutes of Meeting, March 2, 1959. Folder: National Aeronautics and Space Council 1959, box: White House, National Aeronautics and Space Council, 1958-59, NHDRC.
- _____. Minutes of Meeting, April 27, 1959. Folder: Summary of National Aeronautics and Space Council Meetings, 1958-1960," box: White House, National Aeronautics and Space Council, NHDRC.
- _____. Minutes of 7th Meeting, October 26, 1959. Folder: 7th Meeting, box 2, RG 220, NARA.
- _____. Selected Congressional Testimony - 1968. Folder: Space Projects - MOL, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Summary Minutes, August 18, 1961. Folder: NASC Meeting August 18, 1961, box: 1, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Summary Minutes, July 17, 1963. Folder: July 17, 1963 NASC meeting, box 3, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Summary Minutes, July 31, 1963. Folder: NASC Meeting July 31, 1963, box 3, RG 220, Records of the National Aeronautics and Space Council, NARA.

- _____. Summary Minutes. July 9, 1965. Folder: Official Record Copy. NASC Meeting. July 9, 1965. box 4, RG 220, Records of the National Aeronautics and Space Council, NARA. Declassified at author's request.
- _____. Summary Minutes. June 15, 1966. Folder: NASC Meeting June 15, 1966, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Summary Minutes. November 14, 1967. Folder: NASC Meeting. November 14, 1967, box 4, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. U.S. Policy on Outer Space. January 26, 1960. SPI document 92. Also referred to as NSC 5918. Some, but not all, of this document are reprinted in *Exploring the Unknown, Volume I*, 362-73.
- National Military Establishment, James Forrestal. Secretary of Defense. *First Report of the Secretary of Defense, 1948*. Washington, DC: USGPO, 1948.
- National Security Council (NSC). "Comments on the Report to the President by the Technological Capability Panel of the Science Advisory Committee." June 8, 1955. Folder: NSC 5522 - Technological Capabilities Panel (2), box 16, Policy Papers subseries, NSC series, Office of the Special Assistant for National Security Affairs, Records: 1952-1961, White House Office, Dwight D. Eisenhower Library (DDEL).
- _____. Conference in the President's Office, 8:30 a.m., October 8, 1957. Folder: Earth Satellites (1), box 7, Briefing Notes subseries, NSC series, OSANSA: Records, White House Office, DDEL.
- _____. Memorandum of Discussion, 250th Meeting of the National Security Council, May 26, 1955. Folder: 250th Meeting of the NSC, box 6, NSC Series, Ann Whitman File, DDEL.
- _____. Memorandum of Discussion at the 310th Meeting of the NSC, January 24, 1957. Folder: 310th Meeting of the NSC, box 8, NSC series, Ann Whitman file, DDEL.
- _____. Memorandum of Discussion at the 339th Meeting of the NSC, October 11, 1957. Folder: 339th Meeting of the NSC, box 9, NSC series, Ann Whitman File, DDEL.
- _____. Memorandum of Discussion at the 376th Meeting of the NSC, August 14, 1958, dated August 15, 1958. Folder: 376th Meeting of NSC, box 10, NSC series, Ann Whitman file, DDEL.
- _____. Memorandum of Discussion at the 406th Meeting of the NSC, May 13, 1959. Folder: 406th Meeting of the NSC, box 11, NSC series, Ann Whitman file, DDEL.
- _____. Memorandum of Discussion at the 415th meeting of the NSC, July 30, 1959. Folder: 415th Meeting of the NSC, box 11, NSC series, Ann Whitman file, DDEL.
- _____. Memorandum of Discussion at the 466th Meeting of the NSC, November 7, 1960, dated November 8, 1960. Folder: 466th Meeting of the NSC, box 13, NSC series, Ann Whitman file, DDEL.
- _____. Memorandum of Discussion at the 470th Meeting of the NSC, December 20, 1960, dated December 21, 1960. Folder: 470th Meeting of the NSC, box: 13, NSC series, Ann Whitman file, DDEL.
- _____. NSAM 129, US-USSR Cooperation in the Exploration of Space, February 23, 1962. NSA PD document 803.

- _____. NSAM 144, Assignment of Highest National Priority to the Apollo Manned Lunar Landing Program, April 11, 1962. NSA PD document 824.
- _____. NSAM 156, no title, May 26, 1962. Folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA, p. 1. Declassification date: December 31, 1996.
- _____. NSAM 183, Explanation and Defense of US Space Program, August 27, 1962, signed by McGeorge Bundy. Folder: NSAM 136-156, box 3, RG 59, General Records of the Department of State, NARA, 1. Declassification date: December 31, 1996.
- _____. NSAM 271, Cooperation with the USSR on Outer Space Matters, November 12, 1963. NSA PD document 1026.
- _____. NSAM 352, Bridge Building, July 8, 1966. NSA PD document 1147.
- _____. NSC 5520, May 20, 1955. U.S. Scientific Satellite Program. Space Policy Institute Archives (SPI) document 86. Parts are available in Logsdon et. al., *Exploring the Unknown, Volume I*, pp. 308-13.
- _____. NSC 5810/1, May 5, 1958. Basic National Security Policy.
- _____. NSC 5814/1, August 18, 1958. Preliminary U.S. Policy on Outer Space. SPI document 87. Some, but not all, of this document are reprinted in *Exploring the Unknown, Volume I*, 361.
- _____. NSC 5918. See "National Aeronautics and Space Council, U.S. Policy on Outer Space."
- _____. NSC 6021, December 14, 1960. Missiles and Military Satellite Programs. SPI document 722.
- _____. NSC 6108, January 18, 1961. Certain Aspects of Missile and Space Programs. SPI document 278.
- _____. Operations Coordinating Board (OCB). Memorandum of Meeting, June 13, 1957. Folder: OCB Working Group on Earth Satellites, box 1, National Aeronautics and Space Administration series, DDEL.
- _____. OCB. Memorandum of Meeting, Working Group on Certain Aspects of NSC 5520. Folder: OCB Working Group on Earth Satellites, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC.
- _____. OCB. Pentagon briefing memo on earth satellite program, October 12, 1955. Folder: OCB 000.91 Natural and Physical Sciences (3), box 11, OCB Central File Subseries, NSC Staff Papers series, White House Office, DDEL.
- _____. OCB. "Public Information Program With Respect to the Implementation of NSC 5520," July 1955. Folder: OCB 000.91 Natural & Physical Sciences (2), box 11, OCB Central File subseries, NSC Staff Papers series, White House Office, DDEL.
- _____. Planning Board. Report, "U.S. Scientific Satellite Program," November 9, 1956. Folder: NSC 5520 - Satellite Program (1), box 16, Policy Papers subseries, NSC Series, OSANSA, White House Office, DDEL.

Navy, United States, Bureau of Aeronautics. "Investigation of the Possibility of Establishing a Space Ship In an Orbit Above the Surface of the Earth." A.D.R. Report R-48, November 1945. Folder: Navy/BuAer: Earth Satellite Vehicle, DoD subseries, Federal Agencies series, NHDRC.

Neustadt, Richard E. Memorandum for Senator Kennedy, Subject: Space Problems for you to use with Lyndon Johnson, December 20, 1960. *Exploring the Unknown, Volume I*, 413-15; with cover letter dated December 23, 1960, SPI document 1178.

Nixon, Richard M. Memorandum for Heads of Executive Departments and Agencies, January 25, 1969. Folder: NASA-DoD Agreements, box 10, RG 220, Records of the National Aeronautics and Space Council, NARA.

_____. Memorandum for Robert P. Mayo, Director of the BoB, March 24, 1969. Folder: NASA-DoD Agreements, box 10, RG 220, Records of the National Aeronautics and Space Council, NARA.

O'Neill, J.W., Colonel, ARDC/BMD, Deputy Chief of Staff for Plans and Operations. Memorandum, to Colonel Donald Heaton, NASA Technical Assistant to the Director, Launch Vehicle Programs, Subject: Air Force Lunar Research Team, July 30, 1960. Folder: USAF Documents/Correspondence, 1957-1961, DoD subseries, Federal Agencies series, NHDRC.

Packard, Robert F., Office of International Scientific Affairs, State Department. Memorandum to the Executive Secretary, National Aeronautics and Space Council, Subject: Presidential Memorandum of April 9, 1963, dated April 24, 1963. SPI document 972.

Paine, Thomas. Letter to Melvin Laird, August 11, 1969. Folder: NASA/DOD Cooperation/Space Merger?, DoD subseries, Federal Agencies series, NHDRC.

Paine, Thomas. Letter to Clinton Anderson, July 22, 1969. Folder: Space Committee, General, 91st Congress, box 921, Clinton Anderson papers, LoC.

Phillips, Samuel. Report of the Joint Air Force-NASA Military Requirements Review Group, September 1964. Folder: 1964, Manned Lunar Landing Program, Personnel, Military, box 43, Samuel Phillips papers, LoC.

Piland, Robert O. Memorandum to Killian, April 14, 1958. Folder: National Aeronautics and Space Administration (1), box 44, Confidential file, White House Central files, DDEL.

_____. Memorandum to James Killian, June 15, 1958. SPI document 1120.

_____. Memorandum to Killian, Subject: DYNA-SOAR, November 3, 1958. Folder: Missiles April-December 1958 (3), box 12, OSAF, DDEL.

_____. Memorandum to Killian, Subject: Notes on the Space Panel Meeting, July 2, 1958, dated July 8, 1958. SPI document 1127.

_____. Memorandum for Killian, Subject: Responsibility for "Activities Directed Toward the Development of a Manned Satellite." Folder: Space Notebook, Piland, 1958-59 (4), box 16, OSAF, White House Office, DDEL.

_____. Memorandum for Killian, Subject: USAF Dinosaur [sic] Project, February 28, 1958. Folder: Missiles (2), box 12, OSAF, White House Office, DDEL.

Power, Thomas. Letter to Chief of Staff Thomas D. White, August 18, 1958. Folder: Command - SAC, box 16, Thomas D. White papers, Library of Congress.

President's Science Advisory Committee, Executive Office of the President. Introduction to Outer Space, March 26, 1958. SPI document 2. Part of the document is reprinted in *Exploring the Unknown, Volume I*, 332-34.

_____. Memorandum, internal, West Coast Visit of President's Science Advisory Committee. January 19-23, 1959, dated February 2, 1959. Folder: PSAC Correspondence 1959, box: White House, President's Science Advisory Committee. Correspondence 1959-1964, NHDRC.

_____. Report of the Ad Hoc Panel on Man-in-Space. December 16, 1960. *Exploring the Unknown, Volume I*, 408-412.

_____. Strategic Systems Panel. Report on Dynasoar to Kistiakowsky, September 17, 1960. Folder: Missiles July-September 1960 (6), box 12, OSAST, White House Office, DDEL.

Putt, Donald. Letter to Hugh Dryden, January 31, 1958. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.

_____. Memorandum for Chief of Staff, USAF. Subject: Comments Relative to Special Projects Agency, November 22, 1957. K168-8636-25, AFHRA.

_____. Memorandum to Commander, Air Research and Development Command. Hypersonic Research Aircraft, January 31, 1958. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.

Quarles, Donald. Letter to BoB Director Maurice Stans, April 1, 1958. K168.8636-23, AFHRA.

_____. Memorandum to the Acting Secretary of the NASC, April 15, 1959. Folder: NASC 1958-1959, box: White House, National Aeronautics and Space Council, NHDRC.

_____. Memorandum for the President, Subject: Earth Satellite, October 7, 1957. Folder: Earth Satellites (1), box 7, Briefing Notes subseries, NSC Series, Office of the Special Assistant for National Security Affairs: Records, 1952-61, White House Office, DDEL.

Rabi, I.I. Letter to Arthur Flemming, Office of Defense Mobilization, October 10, 1956. Folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents, Eisenhower, Space Correspondence (1955-1960), NHDRC.

RAND Corporation. Conference on Methods for Studying the Psychological Effects of Unconventional Weapons, January 26-28, 1949. SPI document 1297.

Rathjens, George W., member of PSAC Strategic Systems Panel. Memorandum for other members of the Panel, September 23, 1960. Folder: Missiles July-September 1960 (6), box 12, OSAST, White House Office, DDEL.

Rosen, Milton, OMSF Director of Launch Vehicles and Propulsion. Memorandum to D. Brainerd Holmes, Director, OMSF, Large Launch Vehicle Programs, November 6, 1961, SPI document 1597.

_____. Senior Scientist, NASA Office of Defense Affairs. Memorandum for Admiral Boone, Gemini Launch Vehicle Man-Rating, October 8, 1965. Folder: USAF Gemini Role Documentation, Gemini series, NHDRC.

- Rostow, Walt W. Memorandum for Kennedy, November 7, 1960. In Paul Kesaris and Robert Lester, Project Coordinators. *President John F. Kennedy's Office Files, 1961-1963, Part 1: Special Correspondence, Speeches, Legislative, and Press Conference Files. In Research Collections in American Politics, Microforms from Major Archival and Manuscript Collections.* William Leuchtenberg, General Editor. Frederick, MD: University Publications of America, 1989. Reel 5.
- Rubel, John H., Deputy DDR&E. Letter to Edward Welsh, April 10, 1962. Folder: NASC meeting, March 21, 1962, box 1, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. signing for Harold Brown. Memorandum for the Secretary of Defense, Air Force Manned Military Space Program, February 20, 1962, with attached DDR&E report, Report on Military Manned Space Program, same date. Folder: Reading File, January-May 1962, box 114, RG 200, Robert McNamara papers, NARA. Declassified at author's request.
- _____. Acting DDR&E. Report to Office of the Secretary of Defense, Progress Report on military space projects, October 20, 1960. NSA MUS document 322.
- _____. Deputy DDR&E. Speech on military space, October 9, 1962, released as DOD News Release No. 1642-62. DOD Office of Public Affairs. John Rubel file, Biographical series, NHDRC.
- _____. and Robert C. Seamans. Memorandum to McNamara and Webb, Recommendation relative to the division of effort between the NASA and the DOD in the development of space rendezvous and capabilities, December 7, 1961. Folder: DOD/ USAF "Blue Gemini," DoD subseries, Federal Agencies series, NHDRC.
- Salter, R.M. and J.E. Lipp. *Utility of a Satellite Vehicle for Reconnaissance*, RAND Report R-217, April 1951, SPI document 1296.
- Schriever, Bernard A., Lieutenant General, USAF, Commander, ARDC. Letter to Glennan, January 11, 1961, folder: Glennan (Select Correspondence), Glennan subseries, Administrators series, NHDRC.
- _____. Letter to CSAF LeMay, undated but sometime shortly after Schriever's testimony to the Senate Armed Services Committee on July 20, 1961. Folder: USAF Documents/Correspondence, DoD subseries, Federal Agencies, NHDRC.
- _____. Letter to CSAF Thomas White, September 15, 1959. Folder: Command - SAC, box 16, Thomas White papers, LoC.
- _____. Letter to Thomas White, October 20, 1960. Folder: 2-6, ARDC, box 33, Thomas White papers, LoC.
- _____. Memorandum to General Curtin, Office of the Secretary of the Air Force, Mercury MA-2 Launch Decision, February 13, 1961. SPI document 32.
- _____. General, Commander, Air Force Systems Command. Memorandum to Lyndon Johnson, April 30, 1961. 168.7171-151, AFHRA.
- _____. Speech to the Allegheny Conference on Community Development, Pittsburgh, PA. November 21, 1960. Inserted into the *Congressional Record*, January 6, 1961. Appendix, A-93 - A-94, by Representative James Fulton.

- _____. Speech to the American Institute of Aeronautics and Astronautics. October 12, 1965. IRIS 1013465, AFHRA.
- _____. Speech to the Aviation Writers Association. May 1966. Reprinted in the *Congressional Record*, June 22, 1966, p. A3272-74.
- Schultz, Kenneth W., Colonel, USAF, Assistant for Manned Orbiting Laboratory, Office of the Deputy Chief of Staff for Research and Development. Congressional Preparation Instruction Letter # 1. Chief of Staff Policy Book - 1965, September 1964. IRIS 1002994, AFHSO.
- _____. Congressional Preparation Instruction # 7, November 27, 1964. IRIS 1002995, AFHSO.
- _____. Inputs on MOL to the Chief of Staff's Posture Statement, November 6, 1964, IRIS 1002995, AFHSO.
- _____. Letter of Nonconcurrence, September 29, 1964. IRIS 1002994, AFHSO.
- Schultze, Charles L., BoB Director. Letter to Webb, FY68 budget, August 13, 1966. Folder: Space-NASA-1966, box 611, RG 359, Office of Science and Technology, NARA, 1. Declassified at author's request.
- _____. Memorandum to Johnson, FY68 budget proposals, September 20, 1966. SPI document 859.
- Science Advisory Committee, Office of Defense Mobilization. Detailed (largely verbatim) notes on meeting of the ODM Science Advisory Committee with the President on October 15, 1957. Folder: Eisenhower Administration - Space Correspondence, box: White House, Presidents. Eisenhower, Space Correspondence (1955-1960), NHDRC.
- Seamans, Robert C., Jr. Letter to Harold Brown, January 6, 1964. Folder: Defense 1964-1965, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Letter to Harold Brown, November 22, 1966, folder: USAF Gemini Role Documentation, Gemini series, NHDRC.
- _____. Letter to Brown, September 27, 1965. Folder: MOL Correspondence, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to John S. Foster, November 22, 1966. Folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to Foster, July 17, 1967. Folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to Schriever, April 12, 1965. Folder: NASA/DoD Cooperation/ Documentation, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to Lieutenant General H.M. Wade, Deputy Chief of Staff for Personnel, USAF, January 4, 1967. Folder: Military Personnel Detailed to NASA, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to Thomas White, February 28, 1961. Folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas White papers, LoC.

- _____. Memorandum for Record. The NASA Position on the DOD Manned Orbiting Laboratory Project, December 19, 1963. Folder: DOD-NASA Coordination, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA.
- _____. Memorandum to Dr. Albert C. Hall, Deputy Director for Space, DDR&E, Proposed answers to potential queries on the MOL program, August 5, 1965. Safe # 1, drawer 2, folder: MOL/AES, NHDRC, 1. Declassified at author's request; therefore, this document could have been integrated into the NHDRC's main unclassified collection by NASA archival staff.
- _____. Memorandum to Webb, Planning of a DOD-NASA Program for Development of Large Launch Vehicles, July 7, 1961. Folder: AACB Minutes & Reports, box: Arnold Levine, Selected Sources from the author, NHDRC.
- _____. Memorandum for Webb, Position of NASA in Regard to a Military MOL Program, July 7, 1965. Folder: MOL Correspondence II, DoD subseries, Federal Agencies series, NHDRC.
- _____. Memorandum to Dryden and Webb, September 11, 1963. SPI document 1456.
- _____. Speech to the Aerospace Corporation, August 29, 1961. Defense Technical Information Center AD-B185 903.
- _____. Statement before the Subcommittee on Manned Space Flight, House Committee on Science and Astronautics, FY67 budget, February 18, 1966. Folder: Seamans, House of Representatives, Seamans subseries, Deputy Administrators series, NHDRC.
- _____. and DDR&E John S. Foster. Memorandum of Agreement, Establishment of a Manned Space Flight Experiments Board, March 21, 1966. Folder: MSF Panel AACB, box: Aeronautics and Astronautics Coordinating Board # 2, NHDRC.
- Shapley, Willis, Military Division, BoB. Memorandum for BoB Director, Man-in-Space briefing and agenda item for Space Council meeting, October 28, 1958. Folder: National Aeronautics and Space Council 1958, box: White House, National Aeronautics and Space Council, 1958-59, NHDRC.
- _____. Memorandum to BoB Director, December 6, 1963. File: Space Projects - MOL, Space Stations, box 21, RG 220, Records of the National Aeronautics and Space Council, NARA.
- Sharp, Dudley. Memorandum for the Chief of Staff, USAF, September 13, 1960. Folder: 4-5 Missiles/Space/Nuclear, box 36, Thomas White papers, LoC.
- Shaughnessy, John J., Colonel, Chief, Plans Group, Legislative Liaison, USAF. Statement re MOL Cancellation. Reprinted in *Congressional Record*, June 10, 1969.
- Sheldon, Charles S., NASC. Memorandum to NASC Executive Secretary Edward Welsh, Draft NASA Report to the President, November 24, 1964. Tab 2, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA. Declassified at author's request.
- Siepert, Albert F. Memorandum to Webb, Length of Tours of Certain Military Detailees, February 8, 1963. *Exploring the Unknown, Volume I*, 673-74.
- Smith, James G., Colonel, Assistant for Public Affairs, Office of the DoD Manager for Manned Space Flight Support Operations, USAF. *Department of Defense Support: Apollo 11*, July 1969. Folder: 1969, Manned Lunar Landing Program, Apollo 11, Department of Defense, box 108, Samuel Phillips papers, LoC.

Soule, Hartley A., Research Airplane Projects Leader, NACA. Memorandum to NACA Headquarters. Role of NACA in Development of Hypersonic Glide Rocket Conceptual Test Vehicle. Dyna Soar I, February 10, 1958. Folder: Dyna Soar Proposals & Evaluation. DoD subseries, Federal Agencies series, NHDRC.

Spriggs, James O., NASA member of, Ad Hoc Subpanel on Security Practices of the Supporting Space Research and Technology Panel of the AACB. Memorandum for the Record. Imagery from Space, February 16, 1967. Folder: Resolution from Space. DoD subseries, Federal Agencies series, NHDRC.

Staff Secretary, Office of the. Memorandum of Conference with the President, October 9, 1957. Folder: Missiles and Satellites, Vol. 1 (3), box 6, Department of Defense subseries, Subject Series, Office of the Staff Secretary: Records, DDEL.

Stans, Maurice. Memorandum to Eisenhower, July 29, 1958. Folder: Staff Memos - July 1958 (1), box 35, DDE Diary series, Ann Whitman file, DDEL.

State Department. Airgram, Amembassy Moscow, to State Department. Subject: Soviet Plans for Placing a Man on the Moon, March 22, 1963. Folder: SP Space and Astronautics, USSR, box 4186, RG 59, General Records of the Department of State, Central Foreign Policy File, NARA.

_____. Internal Memorandum, Subject: Reconnaissance Satellite Program, September 14, 1960. Folder: 12 Satellite and Missile Programs, box 6, RG 59, General Records of the Department of State, Bureau of European Affairs, Office of Soviet Union Affairs, Subject Files 1957-1963, NARA.

_____. Memorandum of Conversation, June 3, 1961, Vienna, 12:45 a.m. In the document collection, National Security Archive, *The Berlin Crisis, 1958-1962*. Alexandria, VA: Chadwyck-Healey, Inc., 1991, document 2074.

_____. Memorandum of Conversation, June 4, 1961, Vienna, 3:15 p.m., supra, document 2077.

_____. Memorandum of Conversation, Vienna, June 4, 1961, supra, document 2079.

_____. Memorandum of Conversation Between Secretary of State Rusk and the President's Special Assistant for National Security Affairs [M. Bundy], September 5, 1961. Reprinted in David Mabon and David Patterson, editors, *Foreign Relations of the United States, 1961-1963, Volume VII: Arms Control and Disarmament*. Washington, DC: USGPO, 1995.

_____. Paper on SAMOS satellite, July 18, 1960. Folder: 12 Satellite and Missile Programs, box 6, RG 59, General Records of the Department of State, Bureau of European Affairs, Office of Soviet Union Affairs, Subject Files 1957-1963, NARA.

_____. Report to McGeorge Bundy. Summary of Foreign Policy Aspects of the U.S. Outer Space Program, June 5, 1962. SPI document 1539.

_____. Report, Space Goals after the Lunar Landing, October 1966. SPI document 849.

_____. Director of Intelligence and Research. Note, Khrushchev's Obscure and Noncommittal Statements About Moon Shots, November 5, 1963. Folder: Space Projects - Manned Lunar Landing, box 21, RG 220 - Records of the National Aeronautics and Space Council, NARA.

- _____. Policy Planning Council. Special Assistant for Soviet Bloc Politico-Military Affairs. Planning Implications for National Security of Outer Space in the 1970s. January 30, 1964. SPI document 1538.
- Sylvester, Arthur. Office of the Assistant Secretary of Defense for Public Affairs. Memorandum for Kennedy. January 26, 1961. NSA MUS document 639.
- Technological Capabilities Panel (TCP). Final report. *Meeting the Threat of Surprise Attack: The Report to the President by the Technological Capabilities Panel of the Science Advisory Committee*, two volumes. February 14, 1955. SPI document 1410.
- Teller, Edward. *Report of the Teller Ad Hoc Committee*, October 28, 1957. K140.11-3, Air Force History Support Office, Washington, DC (AFHSO).
- Twining, Nathan. Memorandum for the Secretary of Defense. August 11, 1958. *Exploring the Unknown, Volume I*, 359-60.
- U.S. Congress. Public Law 85-825, Advanced Research Projects Agency, February 12, 1958. SPI document 1541.
- _____. *National Aeronautics and Space Act of 1958, Conference Report*. Report No. 2166. 85th Congress, 2d Session, July 15, 1958.
- _____. Committee on Appropriations. *Department of Defense Appropriations for 1960*. Hearings. Part 6: "Research, Development, Test, and Evaluation." 86th Congress, 1st Session, 1959.
- _____. *Department of Defense Appropriations for 1965*. Hearings. Part 5. 88th Congress, 2nd Session, 1964.
- _____. *Department of Defense Appropriations for 1966*. Hearings. Parts 3 (March) and 5 (April). 89th Congress, 1st Session, April 1965.
- _____. Subcommittee on Independent Offices. *Independent Offices Appropriations Bill, 1964*. Report No. 824. 88th Congress, 1st Session, October 7, 1963.
- _____. *Independent Offices Appropriations for 1966*. Hearings. Part 2. 89th Congress, 1st Session, April, 1965.
- _____. *Independent Offices Appropriations for 1967*. Hearings. Part 2. 89th Congress, 2nd Session, 1966.
- _____. Committee on Armed Services. *DoD Authorizations for Fiscal Year 1967*. Hearings. 89th Congress, 2nd Session, March 1966.
- _____. *Military Posture*. Hearings. 88th Congress, 1st Session, 1963.
- _____. Committee on Government Operations. *Government Operations in Space (Analysis of Civil-Military Roles and Relationships)*. Thirteenth Report. 89th Cong, 1st Session, House Report No. 445, June 4, 1965.
- _____. *Missile and Space Ground Support Operations*. Report No. 1340. 89th Congress, 2nd Session, March 21, 1966.

- _____. Committee on Naval Affairs. *National Advisory Committee for Aeronautics*. Report No. 1423. 63rd Congress, 3rd Session, February 27, 1915.
- _____. Committee on Science and Astronautics. *Amending the National Aeronautics and Space Act of 1958*. Report No. 1633. 86th Congress, 2nd Session, March 1960.
- _____. *Defense Space Interests*. Hearings. 87th Congress, 1st Session, March 1961.
- _____. *Legislative History of the Space Law of 1958 Establishing the World's First Civilian Space Agency: A Detailed Documentation of the Enactment by Congress of a New Law*. Report. 86th Congress, 2nd Session, August 1960.
- _____. *Military Astronautics (Preliminary Report)*. Report No. 360. 87th Congress, 1st Session, May 5, 1961.
- _____. *NASA Authorization, 1969*. Hearings. Part 1. 90th Congress, 2nd Session, February 1968.
- _____. *Space, Missiles, and the Nation*. Report. 86th Congress, 2nd Session, July 5, 1960.
- _____. *Transfer of the Development Operations Division of the Army Ballistic Missile Agency to National Aeronautics and Space Administration*. Hearings. 86th Congress, 2nd Session, February 1960.
- _____. Subcommittee on NASA Oversight. *The NASA-DOD Relationship*. Report. 88th Congress, 2nd Session, 1964.
- _____. Select Committee on Astronautics and Space Exploration. *Astronautics and Space Exploration*. Hearings. 85th Congress, 2nd Session, 1958.
- _____. *Comparison of H.R. 12575 as passed by the House and as Passed the Senate, June 18, 1958*. Committee Print. 85th Congress, 2nd Session, 1958.
- _____. *Establishment of the National Space Program*. Report No. 1770. 85th Congress, 2nd Session, May 24, 1958.
- _____. *The National Space Program*, House Report No. 1758, 85th Congress, 2nd Session, May 21, 1958.
- U.S. Congress. Senate. Committee on Aeronautical and Space Sciences. *Manned Orbiting Laboratory*. Hearings. 89th Congress, 2nd Session, February 24, 1966.
- _____. *NASA Authorization for Fiscal Year 1963*. Hearings. 87th Congress, 2nd Session, June 1962.
- _____. *Soviet Space Programs: 1962-1965*. Report prepared by the Legislative Reference Service. 89th Congress, 2nd Session, December 1966.
- _____. Staff report, Khrushchev's Statement to American Businessmen, November 7, 1963. Folder: Senate Committee on Space and Astronautics, 5 of 5, box 908, Clinton P. Anderson papers, LoC.
- _____. Subcommittee on Government Organization for Space Activities. *Government Organization for Space Activities*. Report No. 806. 86th Congress, 1st Session, August 25, 1959.
- _____. *Investigation of Governmental Organization for Space Activities*. Hearings. 86th Congress, 1st Session, 1959.

- _____. Subcommittee on NASA Authorizations. *Transfer of the Von Braun Team to NASA*. H.J. Res. 567. 86th Congress, 2nd Session, February 18, 1960.
- _____. Committee on Appropriations. *Independent Offices Appropriations, Fiscal Year 1969*. Hearings. 90th Congress, 2nd Session, March 1968.
- _____. Committee on Armed Services. Preparedness Investigating Subcommittee. *Inquiry into Satellite and Missile Programs*. 85th Congress, 1st and 2nd Sessions, 1958.
- _____. Special Committee on Space and Astronautics. *Final Report*. Report No. 100. 86th Congress, 1st Session, March 11, 1959.
- _____. *National Aeronautics and Space Act*. Hearings. 85th Congress, 2nd Session, 1958.
- _____. *National Aeronautics and Space Act of 1958*. Report No. 1701. 85th Congress, 2nd Session, June 11, 1958.
- _____. *S. 3609: A Bill Establishing a National Aeronautics and Space Agency, with a Section by Section Analysis and Staff Explanation and Comments*. Confidential Committee Print. 85th Congress, 2nd Session, May 31, 1958.
- Vance, Cyrus R., Deputy Secretary of Defense. Memorandum for the President, February 12, 1966. NSA MUS document 454.
- Vandenberg, Hoyt S., Vice Chief of Staff of the Air Force. Policy statement, January 12, 1948. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- Waterman, Alan. Confidential Memorandum for Robert Murphy, March 18, 1955. Folder: OCB 000.91 Natural & Physical Sciences (2), box: 11, OCB Central Files subseries, NSC: Staff Papers series, White House Office, DDEL.
- _____. Confidential letter from Waterman to Quarles, May 13, 1955. SPI unnumbered document.
- Webb, James E. Letter to David Bell, March 17, 1961. Folder: Apollo 1961 Decision Documentation, box: White House, Presidents, Kennedy, Correspondence, Apollo Decision Documentation, NHDRC.
- _____. Letter to W. Fred Boone, February 13, 1963. Folder: X-20 Correspondence, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to Senator Everett Dirksen, August 9, 1966. *Exploring the Unknown, Volume I*, 492-94.
- _____. Letter to Hugh Dryden and Robert Seamans, May 4, 1962. Folder: Webb, Correspondence, Jan-Jun 1962, Webb subseries, Administrators series, NHDRC.
- _____. Letter to Lyndon Johnson, May 4, 1961. Folder: NASC 1960-1961, box: White House, National Aeronautics & Space Council, NHDRC.
- _____. Letter to Johnson, May 3, 1963. Folder: NASC meeting May 7, 1963, box 3, RG 22 - National Aeronautics and Space Council, NARA.
- _____. Letter to Johnson, January 28, 1964. Tab 4, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA, 2. Declassified at author's request.

- _____. Letter to Johnson, May 16, 1966. Folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified items, NHDRC.
- _____. Letter to Johnson, August 26, 1966, SPI document 860.
- _____. Letter to John F. McConnell, Chief of Staff of the Air Force, December 29, 1966. Folder: DOD/USAF/NASA - Vietnam cooperation, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to McNamara, July 7, 1961. Folder: Webb correspondence, 1961, Webb subseries, Administrators series, NHDRC.
- _____. Letter to McNamara, January 16, 1963. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- _____. Letter to McNamara, April 24, 1963. SPI document 1457.
- _____. Letter to McNamara, October 14, 1964. IRIS 1002995, AFHSO.
- _____. Letter to Dr. Arthur E. Raymond, NASA Consultant, February 13, 1963. Folder: Webb Correspondence, Jan-Jun 1963, Webb subseries, Administrators series, NHDRC.
- _____. Letter to Seamans, January 18, 1963. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- _____. Letter to General Maxwell Taylor, January 16, 1964. Folder: DOD Joint Chiefs of Staff, DoD subseries, Federal Agencies series, NHDRC.
- _____. Letter to Edward C. Welsh, May 7, 1963. Folder: NASC 1962-1972, box: White House, National Aeronautics and Space Council, NHDRC.
- _____. Letter to Eugene Zuckert, May 28, 1962. Folder: Webb, declassified papers, 1961-1968, Webb subseries, Administrators series, NHDRC.
- _____. Letter to Zuckert, December 11, 1963. Folder: 1964, Manned Lunar Landing Program, box 43, Samuel Phillips papers, LoC, 1-3.
- _____. Memorandum for Robert C. Seamans, December 13, 1963. Folder: December 1963, box 35, James Webb papers, Harry S. Truman Library (HSTL).
- _____. Memorandum for the Record, February 24, 1961. SPI document 984.
- _____. Memorandum for the Vice President, May 10, 1963. Folder: Eisenhower - Defense Policy [memo is probably misfiled], box: White House, Presidents, Eisenhower, Space Documentation, NHDRC.
- _____. Memorandum for the Vice President, July 30, 1963. Folder: Johnson - Declassified Space Correspondence, box: White House, Presidents, Johnson, Correspondence, NHDRC.
- _____. Memorandum for the Vice President, Space Stations, August 9, 1963. Folder: Johnson Correspondence, NASA, box: White House, Presidents, Johnson, Correspondence, Declassified Items, NHDRC.

- _____. Memorandum for Johnson, Review of Developments in US Cooperation with the Soviet Union in Outer Space Matters. December 18, 1964. NSA PD document 1045.
- _____. Press Conference transcript, September 16, 1968. Folder: Webb, Press Conferences, Webb subseries, Administrators series, NHDRC.
- _____. Report for Kennedy, November 30, 1962. *Exploring the Unknown, Volume I*, 461-467.
- _____. Report. US-USSR Space Cooperation - Experience and Projections. January 30, 1967. Folder: Administrator's Reference and Backup Book, box 133, James Webb papers, HSTL.
- _____. Speech at the NASA-Industry Program Plans Conference. February 11-12, 1963. Extracted in *The Military Mission in Space: A Selection of Published Views, August 1962-June 1963*. Folder: Military Mission in Space. DoD subseries, Federal Agencies series, NHDRC.
- _____. Speech at the US Naval Academy, April 8, 1965. Folder: Speech File I, February 23 - April 8, 1965, box 220, James Webb papers, HSTL.
- _____. Statement before the Senate Committee on Aeronautical and Space Sciences, March 4, 1964. Folder: Senate Committee on Aeronautical and Space Sciences, box: 153, James Webb papers, HSTL.
- _____. Statement to the Senate Appropriations Committee, Subcommittee on Independent Offices, May 17, 1968. Folder: Subcommittee on Independent Offices, May 1968, box 155, James Webb papers.
- _____. and Roswell Gilpatric. Joint Memorandum, National Launch Vehicle Program Summary, February 14, 1961. SPI document 26.
- _____. and Robert McNamara. Agreement Between the National Aeronautics and Space Administration and the Department of Defense Concerning the Gemini Program, January 21, 1963. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- _____. Agreement Covering a Possible New Manned Earth Orbital Research and Development Project, with attachment, August 17, 1963 for Webb's signature. September 14, 1963 for McNamara's signature. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.
- _____. Memorandum for Vice President Lyndon B. Johnson. "Recommendations for Our National Space Program: Changes, Policies, Goals", May 8, 1961. *Exploring the Unknown, Volume I*, 440-452.
- _____. Memorandum of Understanding, Manned Space Flight Programs of the Two Agencies, January 14, 1966. IRIS 1003002, AFHSO.
- _____. and Eugene Zuckert. Memorandum of Understanding. Principles for NASA Participation in Dyna-Soar Program System 620A, August 7, 1962. Folder: Dyna-Soar, DoD subseries, Federal Agencies series, NHDRC.
- Weitzen, William, Deputy for Operations, Research, and Development. Memorandum to Assistant Secretary of the Air Force for R&D Richard Horner, Subject: Astronautics Planning, December 18, 1957. K168.8636-9, AFHRA. Declassified at author's request.

Welsh, Edward C. Memorandum to the Vice President, Military vs. Non-Military Space Activities. January 19, 1963. Folder: Defense 1963, box 17, RG 220, Records of the National Aeronautics and Space Council, NARA.

_____. Memorandum for the Vice President, March 4, 1968. Folder: National Aeronautics and Space Administration, 1967 & 1968, box 23, RG 220, Records of the National Aeronautics and Space Council, NARA.

_____. Message to the American Legion, October 6, 1962. Folder: McNamara-Webb Report/Logsdon Interviews, box: White House, Presidents, Kennedy, Correspondence, Apollo Decision Documentation, NHDRC.

_____. Report by NASC Executive Secretary Edward C. Welsh, Premier Khrushchev's Statement r.e. Moon Project," October 29, 1963, including as an attachment, Khrushchev, Address to Third World Meeting of Journalists, October 25, 1963. Folder: Space Projects - Manned Lunar Landing, box 21, RG 220 - Records of the National Aeronautics and Space Council, NARA.

Whisenand, James, Major General Assistant Deputy CSAF for Research and Technology. Memorandum to CSAF LeMay, January 30, 1963. Folder: 208, box B208, Curtis LeMay papers, LoC, 1. Declassified at author's request.

White House/BoB. Memorandum, specific executive branch authorship unknown, Sequence of Events in the Development of the National Aeronautics and Space Act of 1958, April 8, 1958. Box: White House, Presidents, Eisenhower, National Aeronautics and Space Act, W/H and BoB Space Act documents from National Archives (Record Group 51), NHDRC.

_____. Office of the Press Secretary. Statement of the President, August 25, 1965. NSA MUS document 453.

White, Thomas. Letter to Generals Landon and Wilson, Air Force Deputy Chiefs of Staff for Personnel and Development, with copies to Schriever and LeMay, among others, April 14, 1960. Folder: Civilian vs. Military Role in Space, DoD subseries, Federal Agencies series, NHDRC.

_____. Letter to Webb, January 31, 1961. Folder: Webb nomination, Webb subseries, Administrators series, NHDRC.

_____. Memorandum to Joseph Charyk, October 27, 1959. Folder: Chief of Staff Signed Memos, box 26, Thomas White papers, LoC.

_____, and Hugh Dryden. Memorandum of Understanding (MOU), Principles for Participation of NACA in the Development and Testing of the 'Air Force System 464L Hypersonic Boost Glide Vehicle (Dyna Soar I), May 20, 1958. Reprinted in Logsdon et. al., *Exploring the Unknown, Volume II*, supra.

_____, and T. Keith Glennan. MOU, Principles for Participation of NASA in Development and Testing of the Air Force System 464L Hypersonic Boost Glide Vehicle (Dyna Soar I), November 14, 1958. Folder: X-20 Correspondence, DoD subseries, Federal Agencies series, NHDRC.

Whitman, Ann. Diary entry for November 22, 1957. Folder: November '57 A.C.W. DIARY (1), box 9, Administration series, Ann Whitman File, DDEL.

Wiesner, Jerome, et. al. Report to the President-Elect of the Ad Hoc Committee on Space, January 10, 1961. SPI document 1238. Some, but not all, of the Wiesner Report is reprinted in *Exploring*

the Unknown, Volume I, 416-423. In addition, Section V of the Wiesner Report is the military space section and to the best of the author's knowledge has been first declassified as a result of the author's request. See folder: Space, Man-in-Space, 1962, box 167, RG 359, Office of Science and Technology, NARA.

Wilson, Charles. Memorandum for the Secretaries of the Army, Navy, and Air Force, March 28, 1955. K140.11-11. AFHRA.

Wilson, Roscoe C., Lieutenant General, Deputy CSAF for Development. internal memorandum, Response to Mr. Brooks, dated only March 1961. IRIS 1002992, AFHSO.

_____. Letter to General Thomas White, April 7, 1960. Folder: 7-4 FAA/NASA/JCS/CIA/CAP, box 39, Thomas D. White papers, LoC.

Wood, Clotaire. Memorandum for Glennan, October 29, 1958. Folder: Air Force Space - AFCHO, DoD subseries, Federal Agencies series, NHDRC.

_____. Memorandum for Files, Tabling of Proposed Memorandum of Understanding between Air Force and NACA - Project for a Recoverable Manned Satellite Test Vehicle, April 11, 1958, dated May 20, 1958. SPI document 288.

_____. Assistant to the Director for Research Management, NACA. Transmittal of copies of proposed memorandum of understanding between Air Force and NACA for joint NACA-Air Force project for a recoverable manned satellite test vehicle, April 11, 1958. SPI document 117.

Yarymovych, Michael, NASA, and Colonel Kenneth W. Schultz. Report to the Manned Space Flight Panel of the AACB on DOD-NASA Advanced Earth Orbital Systems Study Coordination, IRIS 1003002, AFHSO.

Young, R.P., NASA Executive Officer. Letter to Director of Personnel Lacklen, Proselytizing of Military Personnel, September 10, 1963. Folder: Military Personnel Detailed to NASA, DoD subseries, Federal Agencies series, NHDRC.

Zuckert, Eugene. Letter to Dryden, May 5, 1964. Folder: 1964, Manned Lunar Landing Program, Personnel, Military, box 43, Samuel Phillips papers, LoC.

_____. Letter to Webb, August 25, 1961. IRIS 1003003, AFHSO.

_____. Memorandum to McNamara, February 26, 1963. Folder: 6 - 1963, Air Force, box B129, Curtis LeMay papers.

_____. Memorandum to Schriever, undated but sometime after October 19, 1961. 168.7050-54, AFHRA. Declassified at author's request.

_____. "The Secretary of the Air Force Speaks on Space Programs." *Air Force Information Policy Letter for Commanders*, vol. XVI, No. 2, January 15, 1962. Other Agency Agreements subseries, Federal Agencies series, NHDRC.

_____. Speech, March 6, 1962. Extracted in *Air Force Information Policy Letter for Commanders* XVI (March 15, 1962): 1.

_____. Speech released in the form of DOD News Release No. 1017-62, June 19, 1962. File: Eugene Zuckert, Biographical series, NHDRC.

_____. Statement in the *GE Forum*, January 10, 1962. As reprinted in the collection from the Air Force Office of Information, *Policy Statements on Military Space*, September 19, 1962. 168.7171-65, AFHRA.

Secondary Sources

Books, Monographs, Dissertations, Essays/chapters in books

Ambrose, Mary Stone. *The National Space Program Phase II: Implementation of the National Aeronautics and Space Act of 1958: A Study of NASA's First Two Years of Operations with Emphasis on the Programming and Budgeting Aspects*, August 1960. Folder: Implementation of the Space Act of 1958, box: White House, Presidents, Eisenhower, Space Act Testimony, NHDRC.

Ambrose, Stephen E. *Eisenhower: Volume Two, The President*. New York: Simon and Schuster, 1984.

American Heritage College Dictionary, 3rd ed. Boston and New York: Houghton Mifflin Company, 1993.

Armacost, Michael H. *The Politics of Weapons Innovation: The Thor-Jupiter Controversy*. New York: Columbia University Press, 1969.

Art, Robert J. *The TFX Decision: McNamara and the Military*. Boston: Little, Brown and Company, 1968.

Augenstein, Bruno W. Appendix 1, "Evolution of the U.S. Military Space Program, 1945-1960: Some Events in Study, Planning, and Program Development," in Yuri Ra'anani and Robert L. Pfaltzgraff, Jr., editors, *International Security Dimensions of Space*. Hamden, CT: Archon Books, 1984.

Beard, Edmund. *Developing the ICBM: A Study in Bureaucratic Politics*. New York: Columbia University Press, 1976.

Benson, Charles D. and William B. Faherty. *Moonport: A History of Apollo Launch Facilities and Operations*, NASA SP-4204. Washington, DC: USGPO, 1978.

Berger, Carl. *The Air Force in Space: Fiscal Year 1961*. Washington, DC: United States Air Force Historical Division Liaison Office (USAF HDLO), 1966.

_____. *The Air Force in Space: Fiscal Year 1962*. Washington, DC: USAF HDLO, June 1966.

Beschloss, Michael R. *The Crisis Years: Kennedy and Khrushchev, 1960-1963*. New York: Harper Collins, 1991.

_____. *Mayday: Eisenhower, Khrushchev and the U-2 Affair*. New York: Harper & Row, 1986.

Beukel, Erik. *American Perceptions of the Soviet Union as a Nuclear Adversary*. London and New York: Pinter Publishers, 1989.

Bilstein, Roger. *Orders of Magnitude: A History of the NACA and NASA, 1915-1990*, NASA SP-4406. Washington, DC: USGPO, 1989.

_____. *Stages to Saturn: A Technological History of the Apollo-Saturn Launch Vehicles*, NASA SP-4206. Washington, DC: USGPO, 1980.

- Bornet, Vaughn Davis. *The Presidency of Lyndon B. Johnson*. Lawrence, Kansas: The University Press of Kansas, 1983.
- Bottoms, Edgar M. *The Missile Gap: A Study of the Formulation of Military and Political Policy*. Rutherford, NJ: Farleigh Dickenson University Press, 1971.
- Bowen, Lee. *An Air Force History of Space Activities, 1945-1959*. Washington, DC: USAF HDLO, 1964, SHO-C-64/50.
- . *Threshold of Space: The Air Force in the National Space Program, 1945-1959*. USAF HDLO, 1960. NSA MUS document 314.
- Bradlee, Benjamin. *Conversations with Kennedy*. New York: Norton, 1975.
- Brooks, Courtney G., James M. Grimwood, and Loyd S. Swenson, Jr. *Chariots for Apollo: A History of Manned Lunar Spacecraft*, NASA SP-4205. Washington, DC: USGPO, 1979.
- Brooks, Harvey. "Motivations for the Space Program: Past and Future." In Allan A. Needell, *The First 25 Years in Space* (Washington, DC: Smithsonian Institution Press, 1983).
- Bulkeley, Rip. *The Sputniks Crisis and Early United States Space Policy: A Critique of the Historiography of Space*. Bloomington, IN: Indiana University Press, 1991.
- Burrows, William E. *Deep Black: Space Espionage and National Security*. New York: Berkley Books, 1986.
- . "A Study of Space Reconnaissance: Methodology for Researching a Classified System," in Martin J. Collins and Sylvia D. Fries, editors. *A Spacefaring Nation: Perspectives on American Space History*. Washington, DC: Smithsonian Institution Press, 1991.
- Cantwell, Gerald T. *The Air Force in Space, Fiscal Year 1963*. Washington, DC: USAF HDLO, December 1966. Declassified at author's request.
- . *The Air Force in Space, Fiscal Year 1964*. Washington, DC: USAF HDLO, June 1967. NSA MUS document 330.
- . *The Air Force in Space, Fiscal Year 1965*. Washington, DC: USAF HDLO, April 1968. NSA MUS document 331.
- . *The Air Force in Space, Fiscal Year 1966*. Washington, DC: Office of Air Force History, 1968.
- . *The Air Force in Space, Fiscal Year 1967, Part I*. Washington, DC: Office of Air Force History, 1969.
- . *The Air Force in Space, Fiscal Year 1968, Part I*, October 1970. NSA MUS document 336.
- . *The Air Force-NASA Relationship in Space, 1958-1968*. Washington, DC: Office of Air Force History, October 1971, reprinted November 1990.
- Clements, Henry E., Colonel, USAF. *The Coordination of Manned Spaceflight Operations Between DOD and NASA*, Student Research Report No. 31. Industrial College of the Armed Forces, April 1969.

- Clowse, Barbara Barksdale. *Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958*. Westport, CT: Greenwood Press, 1981.
- Compton, W. David. *Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions*, NASA SP-4214. Washington, DC: USGPO, 1989.
- _____. and Charles D. Benson. *Living and Working in Space: A History of Skylab*, NASA SP-4208. Washington, DC: USGPO, 1983.
- Costigliola, Frank. "Lyndon B. Johnson, Germany, and 'the End of the Cold War,'" in Warren I. Cohen and Nancy Bernkopf Tucker, editors. *Lyndon Johnson Confronts the World: American Foreign Policy, 1963-1968*. New York and Cambridge: Cambridge University Press, 1994.
- Coulman, Robert F. *Illusions of Choice: The F-111 and the Problem of Weapons Acquisition*. Princeton, NJ: Princeton University Press, 1977.
- Coulter, John M., Colonel, and Benjamin L. Loret, Major, USAF. "Manned Orbiting Space Stations," in Eldon W. Downs, editor. *The U.S. Air Force in Space*. New York: Frederick A. Praeger, 1966.
- Davies, Merton E. and William R. Harris. *RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology*. Santa Monica, CA: The RAND Corporation, 1988.
- Dawson, Virginia P. "The Push from Within: Lewis Research Center's Transition to Space," in Martin J. Collins and Sylvia D. Fries, editors. *A Spacefaring Nation: Perspectives on American Space History*. Washington, DC: Smithsonian Institution Press, 1991.
- Day, Dwayne A. "Invitation to Struggle: The History of Civilian-Military Relations in Space," in Logsdon, et. al., *Exploring the Unknown, Volume II, Relations with Other Organizations*, supra.
- _____. "Space Policy-Making in the White House: The Early Years of the National Aeronautics and Space Council," in Roger Launius, editor. *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, AAS History Series volume 18. San Diego, CA: Univelt, Inc., 1995.
- DeVorkin, David H. *Science With A Vengeance: How the Military Created the US Space Sciences After World War II*. New York and Berlin: Springer-Verlag, 1992.
- Diamond, Edwin. *The Rise and Fall of the Space Age*. Garden City, NY: Doubleday & Company, Inc., 1964.
- Divine, Robert A. "Lyndon B. Johnson and the Politics of Space." Chap. in his *The Johnson Years, Volume Two: Vietnam, the Environment, and Science*. Lawrence, KS: The University of Kansas Press, 1987.
- _____. *The Sputnik Challenge*. New York and Oxford: Oxford University Press, 1993.
- Donovan, John C. *The Cold Warriors: A Policy-Making Elite*. Lexington, MA: D.C. Heath and Company, 1974.
- Downs, Anthony. *Inside Bureaucracy*. Boston: Little, Brown and Company, 1967.

- Elliott, Derek W. *Finding an Appropriate Commitment: Space Policy Development Under Eisenhower and Kennedy, 1954-1963*. Ph.D. dissertation, George Washington University, 1992.
- Emme, Eugene M. *A History of Space Flight*. New York: Holt, Rinehart and Winston, Inc., 1965.
- _____. *The Impact of Air Power: National Security and World Politics*. Princeton, NJ: D. Van Nostrand Co., 1959.
- _____. "Presidents and Space," in Frederick C. Durant III, Editor. *Between Sputnik and the Shuttle: New Perspectives on American Astronautics*, American Astronautical Society History Series, volume 3. San Diego, CA: Univelt, Inc., 1981.
- Etzioni, Amitai. *The Moon-Doggle: Domestic and International Implications of the Space Race*. New York: Doubleday & Company, 1964.
- Ezell, Edward Clinton. "The Apollo Program: History Must Judge," in Richard P. Hallion, editor. *Ten Years Since Tranquillity Base*. Washington, DC: Smithsonian Institution Press, 1979.
- _____. and Linda Neuman Ezell. *The Partnership: A History of the Apollo-Soyuz Test Project*, NASA SP-4209. Washington, DC: USGPO, 1978.
- Ezell, Linda Neuman. *NASA Historical Data Book Volume II: Programs and Projects 1958-1968*. NASA SP-4012. Washington, DC: USGPO, 1988.
- _____. *NASA Historical Data Book, Volume III: Programs and Projects, 1969-1978*, NASA SP-4012. Washington, DC: USGPO, 1988.
- Firestone, Bernard J. *The Quest for Nuclear Stability: John F. Kennedy and the Soviet Union*. Westport, CT: Greenwood Press, 1982.
- Fries, Sylvia Doughty. "Introduction," to Martin J. Collins and Sylvia D. Fries, editors. *A Spacefaring Nation: Perspectives on American Space History*. Washington, DC: Smithsonian Institution Press, 1991.
- Frutkin, Arnold. *International Cooperation in Space*. Englewood Cliffs, NJ: Prentice-Hall, 1965.
- Futrell, Robert Frank. *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960, volume I*. Maxwell Air Force Base (AFB), AL: Air University Press, 1989.
- _____. *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, volume II*. Maxwell AFB, AL: Air University Press, 1989.
- Gaddis, John Lewis. *Russia, the Soviet Union, and the United States: An Interpretive History*. New York: John Wiley and Sons, Inc., 1978.
- _____. *Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy*. Oxford and New York: Oxford University Press, 1982.
- Gantz, Kenneth F., Lieutenant Colonel, editor. *Man in Space: The United States Air Force Program for Developing the Spacecraft Crew*. New York: Duell, Sloan and Pearce, 1959.
- Garthoff, Raymond L. *Assessing: Estimates by the Eisenhower Administration of Soviet Intentions and Capabilities*. Washington, DC: The Brookings Institution, 1991.

- Gavin, James M., Lieutenant General, US Army, Retired. *War and Peace in the Space Age*. New York: Harper and Brothers, 1958.
- Gawdiak, Ihor and Helen Fodor. *NASA Historical Data Book, Volume II: NASA Resources, 1969-1978*, NASA SP-4012. Washington, DC: USGPO, 1994.
- Goldman, Nathan C. *Space Policy: An Introduction*. Ames, IA: Iowa State University Press, 1992.
- Green, Constance and Milton Lomask. *Vanguard: A History*, NASA SP-4202. Washington, DC: USGPO, 1970.
- Greenstein, Fred and David Callahan. Chapter 1, "The Reluctant Racer: Dwight D. Eisenhower and United States Space Policy," in the forthcoming Roger D. Launius, editor. *The Myth of Presidential Leadership*. Urbana, IL: University of Illinois Press.
- Greer, Kenneth E. "CORONA," *Studies in Intelligence*, Supplement 17 (Spring 1973) in Kevin C. Ruffner, editor. *CORONA: America's First Satellite Program*, CIA Cold War Records. Washington, DC: Center for the Study of Intelligence, 1995.
- Griffith, Alison. *The National Aeronautics and Space Act: A Study of the Development of Public Policy*. Washington, DC: Public Affairs Press, 1962.
- Grossbard, Stephen I. *The Civilian Space Program: A Case Study in Civil-Military Relations*. Ph.D. dissertation, University of Michigan, 1968.
- Gruen, Adam. *The Port Unknown*. Ph.D. dissertation, Duke University, 1989.
- Hacker, Barton C. and James M. Grimwood. *On the Shoulders of Titans: A History of Project Gemini*, NASA SP-4203. Washington, DC: USGPO, 1977.
- Haines, Gerald. "The National Reconnaissance Office (NRO): Its Origins, Creation, and Early Years," in the forthcoming *Eye in the Sky*. Smithsonian Institution Press.
- Hall, R. Cargill. "Instrumented Exploration and Utilization of Space: The American Experience," in Eugene M. Emme, editor. *Two Hundred Years of Flight in America*, American Astronautical Society History Series, volume 1. San Diego, CA: Univelt, Inc., 1977.
- _____. "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in John M. Logsdon, et. al. *Exploring the Unknown*, volume I, supra.
- _____. "Project Apollo in Retrospect," in *Blueprint for Space*. Washington, DC: Smithsonian Institution Press, 1992.
- _____. "Thirty Years Into the Mission: NASA at the Crossroads," in *Reading Selections: Space Issues Symposium*. Maxwell AFB, AL: Air War College, 1988.
- Hallion, Richard P., editor. *Apollo: Ten Years Since Tranquillity Base*. Washington, DC: Smithsonian Institution Press, 1979.
- _____. *On the Frontier: Flight Research at Dryden, 1946-1981*, NASA SP-4303. Washington, DC: USGPO, 1984.
- Hammond, Paul. *Cold War and Détente: The American Foreign Policy Process Since 1945*. New York: Harcourt Brace Jovanovich, Inc., 1975.

- Hansen, James R. *Enchanted Rendezvous: John C. Houbolt and the Genesis of the Lunar-Orbit Rendezvous Concept*. Monographs in Aerospace History Series # 4. Washington, DC: NASA, December 1995.
- _____. *Engineer in Charge: A History of Langley Aeronautical Laboratory, 1917-1958*, NASA SP-4305. Washington, DC: USGPO, 1987.
- _____. *Spaceflight Revolution: NASA Langley Research Center From Sputnik to Apollo*. NASA SP-4308. Washington, DC: USGPO, 1995.
- Harris, Elwyn D. *Standard Spacecraft Procurement Analysis: A Case Study in NASA-DOD Coordination in Space Programs*. Rand Corporation, R-2619-RC, May 1980.
- Harvey, Dodd L., and Linda C. Ciccoritti. *U.S.-Soviet Cooperation in Space*. Miami, FL: Monographs in International Affairs, Center for Advanced International Studies, 1974.
- Hayes, Peter L. *Struggling Towards Space Doctrine: U.S. Military Space Plans, Programs, and Perspectives During the Cold War*, Ph.D. dissertation. Fletcher School of Law and Diplomacy, Tufts University, 1994.
- Herring, George C. "Introduction," in the Guide to, *Lyndon B. Johnson National Security Files, Agency File, 1963 - 1969*, a microfilm project. Bethesda, MD: University Publications of America, 1993.
- Hirsch, Richard, and Joseph Trento. *The National Aeronautics and Space Administration*. New York: Praeger Publishers, 1973.
- Holmes, Jay. *America on the Moon: The Enterprise of the Sixties*. New York: J.B. Lippincott Co., 1962.
- Horelick, Arnold L. and Myron Rush, *Strategic Power and Soviet Foreign Policy*. Chicago: University of Chicago Press, 1966.
- Houchin, Roy F., II, Major, USAF. *The Rise and Fall of Dyna-Soar: A History of Air Force Hypersonic R&D, 1945-1963*. Ph.D. dissertation, Auburn University, 1994.
- Houston, Robert S., Richard P. Hallion, and Ronald G. Boston. "Transiting from Air to Space: The North American X-15, in Richard P. Hallion, editor. *The Hypersonic Revolution: Eight Case Studies in the History of Hypersonic Technology*, 2 volumes. Special Staff Office, Aeronautical Systems Division, Wright-Patterson AFB, OH, 1987.
- Hungerford, John B. Jr., Major, USAF. *Organization for Military Space - A Historical Perspective*. Air Command and Staff College Report Number 92-1235. Air University, Maxwell AFB, AL, 1982.
- Huntington, Samuel. *The Common Defense: Strategic Programs in National Politics*. New York: Columbia University Press, 1961.
- Johnson, Robert H. *Improbable Dangers: US Conceptions of Threat in the Cold War and After*. New York: St. Martin's Press, 1994.
- Kaplan, Fred. *Wizards of Armageddon*. New York: Simon and Schuster, 1983.
- Kash, Don E. *The Politics of Space Cooperation*. West Lafayette, IN: Purdue University Studies, 1967.

- Kennan, Erlend A and Edmund H. Harvey. *Mission to the Moon: A Critical Examination of NASA and the Space Program*. New York: William Morrow & Company, 1969.
- Killebrew, Timothy, Major, USAF. *Military Man in Space: A History of the Air Force Efforts to Find a Manned Space Mission*, Air Command and Staff College Report No. 87-1425. Maxwell, AFB, AL: Air University, May 1987.
- Kinnard, Douglas. *President Eisenhower and Strategy Management: A Study in Defense Politics*. Lexington, KY: University Press of Kentucky, 1977.
- Klass, Philip J. *Secret Sentries in Space*. New York: Random House, 1971.
- Kraemer, Sylvia K. "NASA and the Challenge of Organizing for Exploration," in Roger Launius, editor. *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, AAS History Series volume 18. San Diego, CA: Univelt, Inc., 1995.
- Kunz, Diane B. "Introduction: The Crucial Decade," in Kunz, editor. *The Diplomacy of the Crucial Decade: American Foreign Relations During the 1960s*. New York: Columbia University Press, 1994.
- Lambright, W. Henry. "James Webb and the Uses of Administrative Power," in Jameson W. Doig and Erwin C. Hargrove, editors. *Leadership and Innovation: A Biographical Perspective on Entrepreneurs in Government*. Baltimore: The Johns Hopkins University Press, 1987.
- _____. *Powering Apollo: James E. Webb of NASA*. Baltimore and London: The Johns Hopkins University Press, 1995.
- _____. *Presidential Management of Science and Technology: The Johnson Presidency*. Austin, TX: University of Texas Press, 1985.
- Launius, Roger D. *NASA: A History of the U.S. Civil Space Program*. Malabar, FL: Krieger Publishing Company, 1994.
- _____. "Early U.S. Civil Space Policy, NASA, and the Aspiration of Space Exploration," in Launius, editor. *Organizing for the Use of Space: Historical Perspectives on a Persistent Issue*, American Astronautical Society History Series, vol. 18. San Diego, CA: Univelt, Inc., 1996.
- Levine, Alan J. *The Missile and Space Race*. Westport, CT: Praeger, 1994.
- Levine, Arnold S. "Management of Large-Scale Technology," in Alex Roland, editor. *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405. Washington, DC: USGPO, 1985.
- _____. *Managing NASA in the Apollo Era*, NASA SP-4102. Washington, DC: USGPO, 1982.
- Levine, Arthur L. *The Future of the U.S. Space Program*. New York: Praeger Publishers, 1975.
- Levy, Lillian. "Conflict in the Race for Space," in Levy, editor. *Space: Its Impact on Man and Society*. New York: W.W. Norton & Company, 1965.
- Link, Mae Mills. *Space Medicine in Project Mercury*, NASA SP-4003. Washington, DC: USGPO, 1965.

- Logsdon, John M. "The Apollo Decision in Historical Perspective," in Richard P. Hallion, editor. *Apollo: Ten Years Since Tranquillity Base*. Washington, DC: Smithsonian Institution Press, 1979.
- _____. *The Decision to Go to the Moon: Project Apollo and the National Interest*. Cambridge, Mass. and London, England: The MIT Press, 1970.
- _____. "Evaluating Apollo." Remarks at a symposium. *Apollo in its Historical Context*. Organized by the Space Policy Institute, Center for International Science and Technology Policy, George Washington University, July 19, 1989.
- _____. "The Evolution of U.S. Space Policy and Plans," in Logsdon, et. al. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I: Organizing for Exploration*, NASA SP-4407. Washington, DC: USGPO, 1995.
- _____. *NASA's Implementation of the Lunar Landing Decision*. Washington, DC: NASA HHN-81, August 1969.
- _____. "National Leadership and Presidential Power." Chapter 7 in the forthcoming Roger D. Launius, editor. *The Myth of Presidential Leadership*. Urbana, IL: University of Illinois Press.
- _____. "Opportunities for Policy Historians: The Evolution of the U.S. Civilian Space Program," in Alex Roland, editor. *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405. Washington, DC: USGPO, 1985.
- Maier, Charles S. "Science, Politics, and Defense in the Eisenhower Era," in George B. Kistiakowsky. *A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology*. Cambridge, MA and London: Harvard University Press, 1976.
- McDougall, Walter A. . . . *The Heavens and the Earth: A Political History of the Space Age*. New York: Basic Books, Inc., Publishers, 1985.
- Meier, Kenneth J. *Politics and the Bureaucracy: Policymaking in the Fourth Branch of Government*. North Scituate, MA: Duxbury Press, 1979.
- Meilinger, Phillip S., Colonel, USAF. *10 Propositions Regarding Air Power*. Washington, DC: USGPO, 1995.
- Morgan, Iwan [not Ivan]. "Eisenhower and the Balanced Budget," in Shirley Anne Warshaw, editor. *Reexamining the Eisenhower Presidency*. Westport, CT: Greenwood Press, 1993.
- Murray, Charles and Catherine Bly Cox. *Apollo: The Race to the Moon*. New York: Simon and Schuster, 1989.
- Neu, Charles E. "The Rise of the National Security Bureaucracy," in Louis Galambos, editor. *The New American State: Bureaucracies and Politics since World War II*. Baltimore and London: The Johns Hopkins Press, 1987.
- Neufeld, Jacob. *The Air Force in Space, Fiscal Years 1969-1970*. Washington, DC: Office of Air Force History, July, 1972.
- _____. *Ballistic Missiles in the United States Air Force, 1945-1960*. Washington, DC: Center for Air Force History, 1990.

- _____. editor. *Research and Development In the United States Air Force*. Washington, DC: Center for Air Force History, 1993.
- Neufeld, Michael J. *The Rocket and the Reich: Peenemunde and the Coming of the Ballistic Missile Era*. New York: The Free Press, 1995.
- Neustadt, Richard. *Presidential Power and the Modern Presidents: The Politics of Leadership from Roosevelt to Reagan*. New York: The Free Press, 1990.
- Newkirk, Roland W., Ivan D. Ertel, and Courtney G. Brooks. *Skylab: A Chronology*. NASA SP-4011. Washington, DC: USGPO, 1977.
- Nieburg, H.L. *In the Name of Science*. Chicago: Quadrangle Books, 1966.
- Piper, Robert F. *The Space Systems Division: Background, 1957-1962*, AFSC Historical Publications Series 62-27, SSEH-40. Air Force Systems Command, 1963.
- Polmar, Norman and Timothy Laur. *Strategic Air Command: People, Aircraft and Missiles*. 2nd edition. Baltimore: Nautical & Aviation Publishing Company, 1990.
- Portree, David S.F. *Thirty Years Together: A Chronology of U.S.-Soviet Space Cooperation*, NASA Contractor Report 185707. NASA, Johnson Space Center, 1993.
- Prados, John. *The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength*. New York: The Dial Press, 1982.
- Redford, Emmette S. and Orion F. White. *What Manned Space Program After Reaching the Moon?: Government Attempts to Decide, 1962-1968*. Syracuse, NY: The Inter-University Case Program, January 1971.
- Reeves, Richard. *President Kennedy: Profile of Power*. New York: Simon & Schuster, 1993.
- Richelson, Jeffrey. *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program*. New York: Harper Collins, 1990.
- Roland, Alex, ed. *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405. Washington, DC: USGPO, 1985.
- _____. "Barnstorming in Space," in Radford Byerly, Jr., editor. *Space Policy Reconsidered*. Boulder, CO: Westview Press, 1989.
- _____. "The Lonely Race to Mars: The Future of Manned Spaceflight," in Radford Byerly, Jr., editor. *Space Policy Alternatives*. Boulder, CO: Westview Press, 1992.
- _____. *Model Research: The National Advisory Committee for Aeronautics, 1915-1958, Volume I*, NASA SP-4103. Washington, DC: USGPO, 1985.
- Roland J. Barber Associates. *The Advanced Research Projects Agency, 1958-1974*. DOD Contract No. MDA 903-74-C-0096, 1975.
- Rosenberg, Max. *The Air Force in Space, 1959-1960*. SHO-S-62/112. Washington, DC: USAF HDLO, 1962.

- Rosholt, Robert L. *An Administrative History of NASA: 1958-1963*. NASA SP-4101. Washington, DC: USGPO, 1966.
- Rotunda, Donald T. *The Legislative History of the National Aeronautics and Space Act of 1958*. NASA HHN-125. NASA Historical Office, 1972.
- Schichtle, Cass. *The National Space Program from the Eighties to the Fifties*. National Security Affairs Monograph Series 83-6. Washington, DC: National Defense University, 1983.
- Schilling, Warren R. "Scientists, Foreign Policy, and Politics." in Davis Dobrow, editor. *Components of Defense Policy*. Chicago: Rand McNally & Company, 1965.
- Schlesinger, Arthur M., Jr. *A Thousand Days: John F. Kennedy In the White House*. Boston: Houghton Mifflin Company, 1965.
- Schoettle, Enid Curtis Bok. "The Establishment of NASA," in Sanford A. Lakoff, editor. *Knowledge and Power: Essays on Science and Government*. NY: The Free Press, 1966.
- Schwiebert, Ernest G. *A History of U.S. Air Force Ballistic Missiles*. New York: Praeger, 1965.
- Shapley, Deborah. *Pride and Power: The Life and Times of Robert McNamara*. Boston: Little, Brown, and Company, 1993.
- _____. "Robert McNamara: Success and Failure," in Jameson W. Doig and Erwin C. Hargrove, editors. *Leadership and Innovation: A Biographical Perspective on Entrepreneurs in Government*. Baltimore: The Johns Hopkins University Press, 1987.
- Sidders, Carl, and Robert Bickett. *Air Force Support of Army, Navy and NASA Space Programs*. A paper prepared by the Office of Information, Western Contract Management Region, AFSC, August 29, 1961. Folder: NASA/DOD Cooperation/Space Merger?, DoD subseries, Federal Agencies series, NHDRC.
- Sidey, Hugh. *John F. Kennedy, President*. New York: Atheneum, 1963.
- Spires, David. Manuscript copy of chapter 2, "From Eisenhower to Kennedy: The National Space Program and the Air Force's Quest for a Space Mission, 1958-1961." From the forthcoming book on the Air Force in space, 1945-1990, to be published by the Office of Air Force History.
- _____. Manuscript copy of chapter 3, "The Air Force in the Era of Apollo: A Dream Unfulfilled." From *ibid*.
- Stares, Paul B. *The Militarization of Space: U.S. Policy, 1945-1984*. Ithaca, NY: Cornell University Press, 1985.
- Swenson, Loyd S. Jr., James M. Grimwood, Charles C. Alexander. *This New Ocean: A History of Project Mercury*. NASA SP-4201. Washington, DC: USGPO, 1966.
- Tucker, Samuel, editor. *A Modern Design for Defense Decision: A McNamara-Hitch-Enthoven Anthology*. Washington, DC, 1966.
- Ulam, Adam. *The Rivals: America & Russia Since World War II*. New York: Penguin Books, 1971.
- Van Dyke, Vernon. *Pride and Power: The Rationale of the Space Program*. Urbana, IL: University of Illinois Press, 1964.

Van Nimmen, Jane, Leonard C. Bruno, and Robert Rosholt. *NASA Historical Data Book, Volume I: NASA Resources 1958-1968*, NASA SP-4012. Washington, DC: USGPO, 1988.

Watson, George M., Jr. *The Office of the Secretary of the Air Force, 1947-1965*. Washington, DC: Center for Air Force History, 1993.

Wilford, John Noble. "A Spacefaring People: Keynote Address." in Alex Roland, editor. *A Spacefaring People: Perspectives on Early Spaceflight*, NASA SP-4405. Washington, DC: USGPO, 1985.

Witkin, Richard. *The Challenge of the Sputniks*. New York: Doubleday, 1958.

Wolfe, Tom. *The Right Stuff*. New York: Sloan, Duell, and Pearce, 1979.

Journals, Periodicals, Papers

Alsop, Stewart. "Outer Space: The Next Battlefield." *Saturday Evening Post* 235 (July 28-August 4, 1962): 15-19.

Armed Forces Management. "Air Force Secretary Brown: Tactical Air Power, A Vital Element in the Application of Military Forces," an interview with Secretary of the Air Force Harold Brown. October 1966, pp. 66-69.

_____. "DOD/NASA Support Costs Revealed." June 1969, p. 31.

Aviation Week. "USAF Pushes Pied Piper Space Vehicle." October 14, 1957: 26.

Aviation Week and Space Technology. "Washington Roundup, Space Lab Merger." November 30, 1964): 17.

_____. "Council [NASC] Compiles List of Space 'Firsts.'" May 16, 1966, p. 100.

_____. "MOL Delayed by Funding Cut." April 21, 1969, p. 17.

Baltimore Sun. "Air Force Orbit Plan is Attacked." January 30, 1969, p. 8A.

Barrett, Laurence. "The Death of the Dyna-Soar Project." *New York Herald Tribune*, December 26, 1963.

Booda, Larry. "Air Force Outlines Broad Space Plans." *Aviation Week* (December 5, 1960): 26-28.

_____. "Kennedy Asks \$51.6 Billion for Defense." *Aviation Week and Space Technology* (January 22, 1962): 26-28.

Butz, J.S., Jr. "Under the Spaceborne Eye: No Place to Hide." *Air Force and Space Digest* (May 1967): 93-98.

_____. "New Vistas in Reconnaissance from Space." *Air Force Magazine* (March 1968): 46-56.

Clark, Evert. "President Reaffirms Goal of Moon Landing by 1970." *New York Times*, March 17, 1966: 1+21.

_____. "Satellite Spying Cited by Johnson." *New York Times*, March 17, 1967, p. 13.

- Coughlin, William J. "The Gleeeful Conspiracy," editorial. *Missiles and Rockets* (April 23, 1962): 46.
- _____. "Speak Up, Mr. Secretary," editorial. *Missiles and Rockets* (June 18, 1962): 46.
- _____. "Eulogy to a Dyna-Soar," editorial. *Missiles and Rockets* (March 11, 1963): 50.
- _____. "The Wall of Space," editorial. *Missiles and Rockets* (December 2, 1963): 48.
- Data. "Interview of Samuel Phillips." April 22, 196, p. 11-12.
- Day, Dwayne. "CORONA: America's First Spy Satellite Program." *Quest: The History of Spaceflight Magazine* 4 (Summer 1995): 4-21.
- Depoe, Stephen P. "Space and the 1960 Presidential Campaign: Kennedy, Nixon, and 'Public Time.'" *Western Journal of Speech Communication* 55 (Spring 1991): 215-233.
- Emme, Eugene M. Chronology of Man-In-Space R&D Program, August 1962. Folder: USAF Man-in-Space Chronology, DoD subseries, Federal Agencies series, NHDRC.
- _____. "Historical Origins of NASA." *Airpower Historian* 10 (January 1963): 18-23.
- _____. "Historical Perspectives on Apollo." *Journal of Spacecraft and Rockets* 5 (April 1968): 369-81.
- Fink, Donald. "CIA Control Bid Slowed Decision on MOL." *Aviation Week and Space Technology* (September 25, 1961): 21.
- Finney, John W. "Air Force Seeks Top Role in Space: Drafts Publicity Offensive Keyed to the Change in Administrations." *New York Times*, December 11, 1960, p. 68.
- _____. "Space Stations to be Tested for Reconnaissance and Command-Post Roles." *New York Times*, December 12, 1963.
- _____. "Pentagon Drops Air Force Plans for Orbiting Lab." *New York Times*, June 11, 1969, p. 10.
- Gibney, Frank. "The Missile Mess." *Harper's Magazine* (January 1960): 38-45.
- Gordon, Michael R. "Russian Military Loses Satellites." *New York Times*, November 22, 1996, A1+A7.
- Gregory, William. "DOD, NASA Agree on Gemini Experiments." *Aviation Week and Space Technology* (June 1, 1964), 38-47.
- Hall, R. Cargill. "Civil-Military Relations in America's Early Space Program." A paper delivered September 21, 1995 at a symposium sponsored by the Air Force Historical Foundation, "The USAF in Space: 1945 to the Twenty-First Century." Andrews AFB, MD.
- _____. "Early U.S. Satellite Proposals." *Technology and Culture*, Vol. IV, No. 4 (Fall, 1963): 410-434.
- _____. "The Eisenhower Administration and the Cold War: Framing American Astronautics to Serve National Security." *Prologue: Quarterly Journal of the National Archives and Record Administration* 27 (Spring 1995): 58-72.

- _____. "From Concept to National Policy: Strategic Reconnaissance in the Cold War." *Prologue: Quarterly Journal of the National Archives and Record Administration* 28 (Summer 1996): 107-125.
- Harvey, Mose L. "Preeminence in Space: Still a Critical National Issue." *Orbis* 12 (Winter 1969): 959-83.
- Hines, William. "Gemini Flight Slated to Carry Sky-Spy Gear." *Washington Evening Star*, August 15, 1965.
- Hotz, Robert. "No Tears for MOL." *Aviation Week and Space Technology*, June 30, 1969, p. 11.
- Houchin, Roy, II. "The Diplomatic Demise of Dyna-Soar: The Impact of International and Domestic Political Affairs on the Dyna-Soar X-20 Project, 1957-1963." *Aerospace Historian* (December 1988): 274-80.
- _____. "Why the X-20 Program was Proposed." *Quest: The History of Spaceflight Magazine* 3 (Winter 1994): 4-12.
- _____. "Interagency Rivalry?" *Quest: The History of Spaceflight Magazine* 4 (Winter 1995): 36-39.
- Journal of the Armed Forces*. "Secretary McNamara Seeks NASA-AF Cooperation on Manned Orbiting Laboratory." December 26, 1964, p. 21.
- Kelly, C. Brian. "Ten Years in the Outer Realm." *Data* (June 1968): 22-24.
- Kennan, George. "The Sources of Soviet Conduct." *Foreign Affairs* 25 (July 1947): 566-582.
- Kinnard, Douglas. "President Eisenhower and the Defense Budget." *Journal of Politics* 39 (August 1977): 596-623.
- Klass, Philip J. "Military Satellites Gain Vital Data." *Aviation Week and Space Technology* (September 15, 1970): 55-61.
- _____. "Big Bird Nears Full Operational Status." *Aviation Week and Space Technology* (September 25, 1972): 17.
- Kolcum, Edward H. "Defense May Ease Impact of X-20 Loss." *Aviation Week and Space Technology* (March 18, 1963): 31.
- Koppes, Clayton R. "The Militarization of the American Space Program." *Virginia Quarterly Review* 60 (1984): 1-20.
- Lapidus, Robert. "Sputnik and Its Repercussions: A Historical Catalyst." *Aerospace Historian* 17 (Summer-Fall 1970): 88-93.
- Launius, Roger D. "'Never was Life More Interesting': The National Advisory Committee for Aeronautics, 1936-1945." *Prologue: Quarterly Journal of the National Archives* (Winter 1992): 361-373.
- _____. "Eisenhower, Sputnik, and the Creation of NASA." *Prologue: The Quarterly Journal of the National Archives and Record Administration* (Summer 1996): 127-140.

- Lederberg, Joshua. "Demands of Vietnam Hobble Our Steps to Outer World." *Washington Post*, March 2, 1968.
- Logsdon, John M. "The Evolution of Civilian Space Exploitation." *Futures, The Journal of Forecasting and Planning* 14 (October 1982): 393-404.
- _____, and Alain Dupas. "Was the Race to the Moon Real?" *Scientific American* (June 1994): 16-23.
- Loory, Stuart. "Project Mercury Comes to End." *New York Herald Tribune*, June 13, 1963.
- _____. "House Rebuffs Kennedy's U.S.-Red Moon Trip in Limiting Space Funds." *New York Herald Tribune*, October 11, 1963.
- Malloy, James A. "The Dryden-Blagonravov Era of Space Cooperation, 1962-1965." *Aerospace Historian* (March 1977): 40-45.
- Mandelbau, Leonard. "Apollo: How the United States Decided to Go to the Moon." *Science* 163 (February 1969): 649-654.
- Mayhall, Gene and D.O. Appleton. "Military Applications of Space Are Inevitable: Interview with Major General Sam Phillips." *Data* (June 1968): 17-19.
- McDougall, Walter. "Technocracy and Statecraft in the Space Age - Toward the History of a Saltation." *American Historical Review* 87 (October 1982): 1010-1040.
- Means, Paul. "Vega-Agena-B Mix-Up Cost Millions." *Missiles and Rockets* (June 20, 1960): 19-20.
- _____. "Policy Split Over Boosters Reported." *Missiles and Rockets*, September 18, 1961, 94-95.
- _____. "In Gilpatric Speech . . . Military Space Move Left to Russians" September 10, 1962, 16.
- _____. "DOD Space Position Defended." February 4, 1963, p. 12.
- _____. "Missiles Gain, Space Suffers at DOD." January 31, 1966: 15-18.
- Murray, Bruce. "Can space exploration survive the end of the Cold War?" *Space Policy* (February 1991): 23-34.
- NASA. *NASA Pocket Statistics, 1996 Edition*. Washington, DC: USGPO, 1996.
- Newsweek*. "For \$1.5 Billion: A New Air Force Eye in the Sky." September 6, 1965, pp. 46-47.
- New York Times*, reprint of press conference after July 29, 1955 IGY satellite announcement, July 30, 1955, 22-23.
- _____. "Pentagon Shows Caution on Space." October 10, 1962, p. 25.
- O'Toole, Thomas. "NASA's Role in War Grows." *Washington Post*, December 4, 1967, 4F.
- Payne, Seth. "After Apollo Blasts Off, What Next in Space?" *Product Engineering* (October 7, 1968): 9-12.
- Pealer, Donald. "Manned Orbiting Laboratory (MOL), Part I." *Quest: The History of Spaceflight Magazine* 4 (Fall 1995): 4-16.

- _____. "Manned Orbiting Laboratory. Part II." *Quest: The History of Spaceflight Magazine* 4 (Winter 1995): 28-35.
- _____. "Manned Orbiting Laboratory. Part III." *Quest: The History of Spaceflight Magazine* 5 (Summer 1996): 16-23.
- Peebles, Curtis. "The Guardians." *Spaceflight* 20 (November 1978): 381-400.
- _____. "The Origins of the U.S. Space Shuttle." *Spaceflight* 21 (November 1979): 435-42.
- Philadelphia Bulletin*. "Laird Cuts \$1.1 Billion; Battle Goes On." May 9, 1969, p. 8.
- Price, Ben. "Nation Ruling Space Rules Every Nation." *New York Herald Tribune*, June 16, 1963, pp. 1, 4-6.
- Richelson, Jeffrey. "From CORONA to LACROSSE: A Short History of Satellites." *Washington Post*, February 25, 1990, B1+B4.
- _____. "The Keyhole Satellite Program." *The Journal of Strategic Studies* 7 (June 1984): 121-153.
- Schmeck, Harold M. "Man's Role in Space Underlined as Astronauts Sight Missile Shot." *New York Times*, August 25, 1965, p. 1.
- Schwartz, Leonard. "Manned Orbiting Laboratory - For War or Peace?" *International Affairs* 43 (January 1967): 51-64.
- Schwiebert, Ernest G. "USAF Ballistic Missiles: 1954-1964." *Air Force/Space Digest* (May 1964): 51-166.
- Sheldon, Charles S. A Comparison of the United States and Soviet Space Programs, Paper No. 10, Program of Policy Studies in Science and Technology, George Washington University, June 1965. SPI unnumbered document.
- Sickman, Philip. "The Fantastic Weaponry." *Fortune* (June 1962): 156-59, 214-18, 223-24.
- Simons, Howard and Chalmers Roberts. "Role in Arms Control Clinched MOL Victory." *Washington Post*, September 5, 1965, 1+3+5.
- Smith, Richard Austin. "Canaveral, Industry's Trial by Fire." *Fortune* (June 1962): 135-39, 200, 204, 206, 211-12.
- Space Daily*. "Air Force Space Plan." October 18, 1962, p. 474.
- _____. "DOD Asks Space Station Role." May 22, 1963, p. 651.
- _____. "The Dyna Soar Paradox." June 26, 1963, p. 827.
- _____. "Gemini NASA/DOD Piggy-Back Experiments." April 17, 1964, p. 102-03.
- _____. "Johnson Sees Major Soviet Space Efforts Upcoming." February 2, 1967, p. 180.
- _____. "MOL Canceled." June 11, 1969, p. 179.

- Technology Week*. "Humphrey: 'Space Program is Here to Stay,' An Exclusive Interview." September 5, 1966, pp. 12-13.
- Time*. "A Quiet Retirement," [referring to Schriever's retirement from the USAF]. September 9, 1966, pp. 24-25.
- US News and World Report*. "Why Spend \$20 Billion to Go to the Moon?" interview with James Webb. July 3, 1961, 58-63.
- _____. "Is U.S. Running Alone in the Race to the Moon? Interview with Sir Bernard Lovell" August 12, 1963, pp. 70-71.
- Washington Sunday Star*. "Johnson Doesn't Want Red First on Moon." May 12, 1963, p. 1.
- Weiner, Tom. "A Secret Agency's Secret Budgets Yield 'Lost' Billions, Officials Say." *New York Times*, January 30, 1996, A1.
- Wilson, George C. "Defense Denies Bid for NASA Programs." *Aviation Week and Space Technology* (June 25, 1962): 34-35.
- _____. "President Will Outline U.S. Space Goals." *Aviation Week and Space Technology* (January 11, 1965): 12.
- Wilson, Glen P. "Lyndon Johnson and the Legislative Origins of NASA." *Prologue: Quarterly Journal of the National Archives* 25 (Winter 1993): 362-371.
- Witze, Claude. "How Our Space Policy Evolved." *Air Force/Space Digest* (April 1962): 83-92.
- Worthman, Paul E., Colonel, USAF. "The Promise of Space." *Air University Review* XX (January-February 1969): 120-27.
- York, Herbert F. and G. Allen Greb. "Military Research and Development: A Postwar History." *Bulletin of the Atomic Scientists* 33 (January 1977): 13-36.
- _____. "Strategic Reconnaissance." *Bulletin of the Atomic Scientists* 36 (April 1977): 33-42.
- Young, Hugo, Bryan Silcock, and Peter Dunn. "Why We Went to the Moon." *Washington Monthly* (April 1970): 28-58.